TWELFTH ANNUAL REPORT

OF THE

REGENTS OF THE UNIVERSITY

OF THE

State of New-York,

ON THE

CONDITION OF THE STATE CABINET

OF

NATURAL HISTORY,

AND THE

HISTORICAL AND ANTIQUARIAN COLLECTION

CONNECTED THEREWITH.

Made to the Assembly, March 15, 1859.

ALBANY:
PRINTED BY C. VAN BENTHUYSEN.
1859.

STATE OF NEW YORK.

No. 186.

IN ASSEMBLY, MAR. 15, 1859.

ANNUAL REPORT

Of the Regents of the University, on the State Cabinet of Natural History.

To the Hon. De Witt C. Littlejohn,

Speaker of the Assembly:

Sir—I have the honor to transmit the Annual Report of the Regents of the University on the State Cabinet of Natural History, and the Historical and Antiquarian collection connected therewith.

I remain, very respectfully,

Your obedient servant,

G. Y. LANSING, *Chancellor.*

March 10, 1859.

REGENTS OF THE UNIVERSITY, 1859.

GERRIT Y. LANSING, LL.D.,
Chancellor.
GULIAN C. VERPLANCK, LL.D.,
Vice-Chancellor.
EDWIN D. MORGAN,
Governor, ex-officio.
ROBERT CAMPBELL,
Lieutenant Governor, ex-officio.
GIDEON J. TUCKER,
Secretary of State, ex-officio.
HENRY H. VAN DYCK,
Sup't Public Instruction, ex-officio.
ERASTUS CORNING.
PROSPER M. WETMORE.
JOHN LORIMER GRAHAM.
GIDEON HAWLEY, LL.D.
DAVID BUEL.
JAMES S. WADSWORTH.
JOHN V. L. PRUYN, LL.D.
ROBERT CAMPBELL.
SAMUEL LUCKEY, D.D.
ROBERT G. RANKIN.
JOHN N. CAMPBELL, D.D.
ERASTUS C. BENEDICT.
GEORGE W. CLINTON.
ISAAC PARKS, D.D.
LORENZO BURROWS.
GEORGE B. CHEEVER, D.D.
ROBERT S. HALE.

S. B. WOOLWORTH, *Secretary.*

STANDING COMMITTEES OF THE REGENTS.

SPECIALLY CHARGED WITH THE CARE OF THE STATE CABINET.

1858.

JOHN A. KING, *Governor.*
HENRY R. SELDEN, *Lieutenant Governor.*
GIDEON J. TUCKER, *Secretary of State.*
REV. DR. CAMPBELL.
JOHN LORIMER GRAHAM.

1859.

EDWIN D. MORGAN, *Governor.*
ROBERT CAMPBELL, *Lieut. Governor.*
REV. DR. CAMPBELL.
JOHN LORIMER GRAHAM.
JAMES S. WADSWORTH.

REPORT.

To the Legislature of the State of New York:

The Regents of the University

Respectfully Report:

The efforts of the Regents, as trustees of the State Cabinet, have been principally directed during the past year to enlarging the collections, and rendering them a better exponent of the Natural History of the State. The labors of the Curator, during a few weeks of the summer, when he could take the field, have supplied many deficiencies, and have contributed essentially to the value and perfection of the Geological department. While the first object is to gather whatever may illustrate the Natural History of this State, it has been regarded as proper and desirable, whenever the opportunity has presented, to place with our own productions, for study and comparison, those of other localities. The Cabinet is thus rendered valuable to the general student, and will furnish him the means of comparing the Fauna of different latitudes; of tracing their range of habitation, and determining their specific analogies and differences.

Among the contributions, it is proper specifically to mention, some fifty beautiful African birds, presented by George Benedict, Esq., through the Hon. Erastus C. Benedict, a member of this Board. They have been prepared with his accustomed skill, by the Taxidermist, and are placed in the case which contains the De Rham collection. In the last report, allusion was made to a collection of shells, which was expected from Mr. Cuming, the distinguished English conchologist. These have been received, and properly arranged, and labelled by Dr. Newcomb, of this city, to whom we have been formerly indebted for similar favors.

A large collection of fossils, from the Eocene Tertiary of the Paris basin, have been presented by W. A. Johnson, Esq., of Utica.

An offer was received, several months since, from Mr. Philip C. Carpenter, of Warrington, England, to present to the State Cabi-

net of New York, a duplicate of the suite of the Mazatlan Mollusca, procured, described, catalogued and arranged by him for the British Museum. The condition of the offer required that the collection should be kept distinct, and open to the examination of students, and that Mr. Carpenter should be permitted personally to arrange it on the same plan which he had adopted in the British Museum, and that his necessary expenses should be paid. The collection embraces about 6,000 specimens, and its value is greatly increased by the many varieties of each species. After full enquiry in regard to the value of the collection, it was determined to accept the offer. Mr. Carpenter arrived a few months since, and has been diligently employed in mounting and arranging the collection. Sufficient space could not be afforded to place the whole under glass, and it became necessary to provide drawers for such parts as could not otherwise be arranged. The cases which have been provided are well adapted for the purpose, and the whole collection, under Mr. Carpenter's admirable method, is unsurpassed for the beauty of its forms, and the convenience of its arrangements. A catalogue by classes, orders and species, will be prepared as soon as the arrangement is completed, and will be submitted in the next annual report. A descriptive catalogue, prepared for the British Museum collection, is placed in one of the cases for the use of students. An appropriation of six hundred dollars, it is believed, will cover the cost of the cases and all other expenses.

By order of the Regents.

G. Y. LANSING, *Chancellor.*

S. B. Woolworth, *Secretary.*

ACCOUNT CURRENT.

THE REGENTS of the University, in account current with the appropriation for preserving and increasing the "State Cabinet of Natural History, and the Historical and Antiquarian Collection annexed thereto, and for defraying the incidental expenses of the same."

DR.

1857,		
Oct. 1.	To balance to new account (See Senate Document of 1858, No. 163, p. 10)	$103 72
Oct. 22.	To amount received from the Comptroller, part appropriation 1857 – 58	110 00
Nov. 18.	To do do	300 00
1858,		
Feb. 10.	To do do	390 00
May 5.	To amount loaned to "Geological Rooms repairs" account	50 00
May 31.	To amount received from sale of a case	5 00
Sept. 6.	To amount returned by J. C. Boynton	3 00
Sept. 8.	To do do	5 00
Sept. 8.	To amount overdrawn by checks, dated July 6th, 1857, and December 19th, 1857	2 00
		$968 72

CR.

1857,				
Oct. 17.	By cash paid C. Dimmick, wages	Voucher	No. 1,	$35 00
Oct. 19.	By " contingents	"	No. 2,	9 43
Nov. 10.	By " William Montonye, cases	"	No. 3,	32 00
Nov. 13.	By " J. A. Hurst, specimens,	"	No. 4,	111 50
Nov. 13.	By " A. M'Clure & Co., camphor	"	No. 5,	17 13
Nov. 17.	By " C. Dimmick, wages	"	No. 6,	35 00
Nov. 23.	By " J. A. Hurst, stands for birds	"	No. 7,	150 00
Nov. 23.	By " William Montonye, cases	"	No. 8,	6 00
Dec. 3.	By " C. Dimmick, wages	"	No. 9,	25 00
Dec. 3.	By " contingents	"	Nos. 10 & 11,	14 81
Dec. 16.	By " Agassiz, Work, vols. 1 & 2	"	No. 12,	24 00
Dec. 19.	By " contingents	"	No. 13,	28 24
1858,				
Jan. 11.	By " Wells & Co. express, quarterly acc.		No. 14,	45 54
Jan. 18.	By " Irving & Willey, expense on case of fossils,	"	No. 15,	16 36
Jan. 22.	By " C. B. Boyle, architect	"	No. 16,	50 00
Jan. 25.	By " J. C. Boynton, wages	"	No. 17,	16 00
Feb. 2.	By " contingents	"	No. 18,	7 09
Feb. 22.	By " contingents	"	No. 19,	20 60
April 12.	By " contingents	"	No. 20,	15 58
May 8.	By " contingents	"	No 21,	53 60
May 20	By " J. C. Boynton	"	No. 22,	16 00
May 31.	By " S. W. Gibbs & Son, aquarium.	"	No. 23,	15 00
June 21.	By " contingents	"	No. 24,	23 80
July 12.	By " contingents	"	No. 25,	8 38
July 12.	By " Col. Jewett, expenses of collections,		No. 26,	100 00
July 20.	By " J. C. Boynton, wages	"	No. 27,	10 00
Aug. 28.	By " J. C. Boynton, wages and expenses,		No. 28,	18 00
Oct. 5.	By " J. C. Boynton and others	"	No. 29,	18 75
	By balance			45 91
				$968 72

In behalf of the Standing Committee on the State Cabinet, I have examined the above account, and find it correct. The payments have been made by order of the Standing Committee, and are accompanied with proper vouchers JOHN A. KING, *Chairman.*

December 27, 1858.

CONTRIBUTIONS

TO THE

PALÆONTOLOGY OF NEW-YORK;

BEING SOME OF THE RESULTS OF

Investigations made during the Years 1855, '56, '57 & '58.

BY JAMES HALL.

The following notices and descriptions of new genera, with other investigations, have been communicated, in part or entirely, at different times, to the Albany Institute; to the Reports of the Regents of the University on the State Collections of Natural History, for the years 1856 and 1858; to the American Association for the Advancement of Science; and are already printed in the third volume of the Palæontology of the State of New-York.

NOTICE

OF THE

GENERA AMBONYCHIA, PALAEARCA AND MEGAMBONIA.

In the first volume of the Palæontology of New-York, I have designated by the generic name Ambonychia a group of certain species which are allied in form and other external characters; but not having at that time seen the structure of the hinge, the generic description could not be founded on the study of these most essential parts. Since then I have obtained casts of *A. radiata*, and separated valves of one or two other species; (and I have also seen some very fine specimens in the collections of the Geological Survey of Canada.) These examples show that *A. radiata* and *A. carinata* have a single large and nearly central muscular impression; one specimen of the former showing distinctly two strong teeth beneath the beak, while at the posterior extremity of the hinge-line there are three lateral elongate and slightly curving teeth, the hinge-area being striated longitudinally. The cardinal teeth of the *A. carinata* are similar, but there is some obscurity in regard to the lateral teeth. These characters probably exist in all those with extended and subspiral unbones and striated or costate surfaces; but in the concentrically striated forms, this hinge structure is somewhat varied, and some of them at least exhibit double muscular impressions, one large subcircular pit lying at the anterior extremity.

Ambonychia radiata

The illustration is from a cast of this species (the beak being left out), showing the cardinal and lateral teeth, the muscular and palleal impressions. The marks of the costæ are preserved in the margin of the cast.

The *Ambonychia obtusa*, and an allied form from Tennessee, have the same general characteristics; while there is a distinct external ligamental area, which is likewise seen in other species.

A farther examination has shown that some species heretofore referred to the Genus MODIOLOPSIS have this structure of hinge, muscular impressions, etc.; while some of those from the Trenton limestone, which I referred to EDMONDIA, have likewise essentially the same structure of hinge as the *Ambonychia obtusa*. The *Edmondia ventricosa*, which is farthest removed from the Ambonychia type, has a wide and deep ligamental area, with three or four oblique teeth beneath the beak, and three lateral oblique teeth at the posterior extremity of the cardinal line.

This character of hinge, although so nearly like that of *Ambonychia radiata*, is nevertheless accompanied by a strong anterior muscular impression, and a less conspicuous posterior one, which renders it necessary to separate the two forms. In *Edmondia ventricosa*, where the hinge-line is less curved than in any other form at present known to me, the structure bears some resemblance to that of MACRODON; but the cardinal line is never so straight, the posterior teeth are not so nearly parallel with the direction of that line, and the shells are externally marked by concentric striæ or laminæ, and never by radiating costæ as in that genus or in the ark-shells of more recent periods.

In view of the knowledge we now possess, it becomes necesssary to separate the fossils formerly united under the Genus AMBONYCHIA, and to place those having double muscular impressions under one division; including with them some forms that have been referred to MODIOLOPSIS and EDMONDIA. At the same time we are not fully aware of the internal characters of MODIOLOPSIS*; but the typical forms of that genus do not present the exterior features which mark those of the group here noticed, and I shall venture to separate the latter under the name PALÆARCA.

* The type of the Genus MODIOLOPTIS is the *M. modiolaris* (*Cypricardites modiolaris* of CONRAD = *Pterinea modiolaris* of the same author, 1838). The Genus CYPRICARDITES, as constituted by Mr. CONRAD, embraced species of more than a single genus. The *C. bisulcata* (1841) is the *Pterinea bisulcata* of the same author (Report of 1838, p. 116); and this fossil is the type of the Genus GRAMMYSIA (*G. hamiltonensis*) of DE VERNEUIL. It is probable that a careful investigation of the numerous species of Lamellibranchiata in the Hamilton and Chemung groups will throw some light upon the generic relations of these fossils with those of the lower rocks. An examination of the casts of *M. modiolaris*, and other allied forms in the Hudson-river group, has not yet disclosed the structure of the hinge; and the large anterior muscular scar is equally common to those species and many similar forms in the Hamilton group, of which we know nothing of the hinge structure.

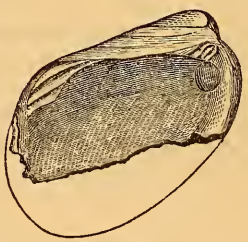
GENUS PALÆARCA.*

GENERIC DESCRIPTION. Shell equivalve, very inequilateral, ovate or rhomboid-ovate, gibbous or ventricose; umbones subanterior: anterior extremity abruptly rounded; posterior extremity broadly rounded, or sometimes obliquely subtruncate: anterior muscular impression very strongly marked (usually a deep round pit), the posterior impression obscurely defined; anterior teeth 3, 4 or 5, oblique, placed beneath or in advance of the umbones, with two or three remote oblique posterior or lateral teeth; palleal line simple; ligament external; ligamental area often deep and wide, striated.

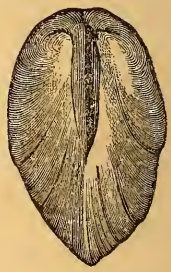
The shells of this genus vary in the development of the ligamental area and in the teeth of the hinge-line, the latter often becoming much thickened, and some of them obsolete with age: the anterior muscular impression is very deep and strong, while the posterior one is superficial, though the shell is always thinner at that point, as frequently observed in worn specimens.

PALÆARCA VENTRICOSA.

1.



2.



3.

Fig. 1. The interior of the right valve of this species, showing the anterior and posterior teeth, the ligamental area and muscular impression.

Fig. 2. The left valve of an older specimen, in which the anterior teeth appear to have been partially obliterated by age. The ligamental area is proportionally wider than in fig. 2.

Fig. 3. A cardinal view of the exterior of the same species, showing the ligamental area.

* This genus was proposed in 1847, and the description has been printed in the Palæontology of New-York, Vol. III, with the accompanying illustrations.

PALÆARCA SAFFORDI.

4. 5.

Fig. 4. The interior of the right valve, showing the hinge-teeth and ligamental area, muscular impressions, etc. The ligamental area is very narrow in the specimen.

Fig. 5. The left valve, showing a wider ligamental area, with the anterior teeth less strongly defined than in the preceding figure, which represents the prevailing character of this part of the shell. The posterior teeth are more oblique and more strongly defined than in fig. 4.

The posterior muscular impression is but faintly defined, though distinctly visible in several specimens, occupying a larger area than the posterior impression ; the shell at that point being much thinner, and often worn through from the exterior, in the specimens examined.

This species occurs in Tennessee, and, like the preceding, in strata of the age of the Trenton limestone, and approaches in form some of the species in New-York, the hinge structure of which is yet unknown.

Under this genus may be arranged the following species from Vol. I, Palæontology of New-York :

Ambonychia obtusa	=	Palæarca	obtusa.
Cardiomorpha vetusta	=	P.	vetusta.
Edmondia subtrun ata	=	P.	subtruncata.
E. subangulata	=	P.	subangulata.
E. ventricosa	=	P.	ventricosa.
Modiolopsis latus	=	P.	lata.
M. subspatulatus	=	P.	subspatulata.

There are, also, besides these, some species in the Lower Helderberg rocks, which resemble the Palæarcæ of the Lower Silurian rocks, both in their general external features and in the large muscular scar. In several forms, however, they approach AVICULA, and do not appear to have had an external ligamental area. A single cast has, upon the anterior portion of the hinge-line, as many as six or seven crenulations ; while the posterior portion of the cardinal line. in another specimen, shows two long narrow teeth. This structure of the hinge-line, though

similar to that of PALÆARCA, differs greatly in the number of teeth, which likewise appear to be simple crenulations transverse to the hinge-line. In this feature, as well as in certain external characters, some of these shells resemble PTEROPERNA; while the Palæarcæ, on the other hand, approach in character to BAKEWELLIA.

Among the fossils of this group are some which, in single valves, present the characters of AVICULA, and have heretofore been referred to that genus; but an examination of specimens which preserve the two valves shows that both valves are gibbous, and that they are essentially equivalved shells, possessing a more or less conspicuous alation upon the anterior and posterior sides. The surfaces of many of these are marked by strong concentric laminæ of growth and fine radiating striæ, corresponding in this character to the surface of some species of AMBONYCHIA.

An examination of the casts from the interior of some of these shells shows that they are provided with a very strongly marked muscular impression close to the anterior extremity. On farther comparison, these forms have much resemblance to some in the Upper Helderberg group; one of which was figured in the Geological Report of the Fourth District in 1843, under the name of *Pterinea? cardiiformis*. This species is expanded on the posterior cardinal line, and has an anterior lobe or wing separated by a sinus from the body of the shell, and possessing a very large muscular impression which lies just within this anterior lobe.

It would appear, therefore, that we have a group of shells, possessing the characters here noticed, and, so far as now known, beginning their existence in the Lower Helderberg group, and extending through the Oriskany sandstone, the Upper Helderberg limestone and the Hamilton group. Although the hinge-structure has not been fully determined, they are clearly separable from AMBONYCHIA, taking *A. bellistriata* and *A. radiata* as the types, by the strong anterior muscular impression, which does not exist in those shells, and by numerous teeth in the anterior part of the hinge.

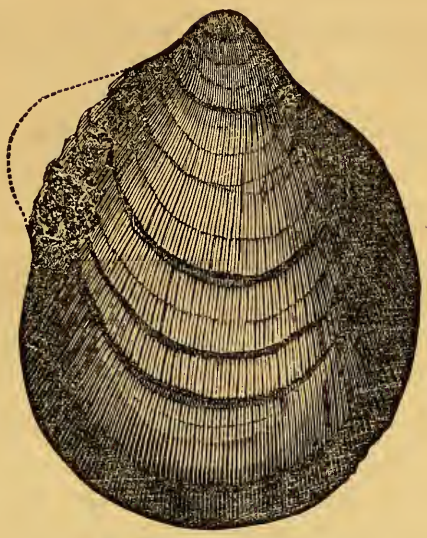
For these forms I propose the generic name *Megambonia*.

GENUS MEGAMBONIA.*

SHELL equivalve or subequivalve, inequilateral, subovoid, usually very gibbous in the middle and towards the unbones: anterior side often lobed or auriculate, a strong muscular impression occupying a considerable portion of this part of the shell; posterior cardinal margin expanded, more or less compressed and frequently alate: hinge-line crenulated on the anterior end, teeth numerous; posterior teeth linear, remote from the umbones.

* Palæontology of New-York, Vol. III.

Surface marked by concentric laminæ of growth, and often by fine radiating striæ.



Megambonia cardiiformis.

The following species from the Lower Helderberg group have been referred to this genus, some of them having been determined from external features alone, and others from the internal casts and a partial exposure of the hinge-line. See Plates 49, 49 *a*, and 50, Palæontology of New-York, Vol. III.

Megambonia suborbicularis.	
M.	spinneri.
M.	aviculoides.
M.	rhomboidea.
M.	mytiloidea.
M.	ovoidea.

Megambonia obscura.	
M.	lata.
M.	oblonga.
M.	cordiformis.
M.	ovata.

NOTE.

In this connection, I may also notice the Genus Cypricardites of Conrad, published in 1841 (Annual Report on the Palæontology of New-York, p. 51), which has been almost entirely overlooked. The description is as follows:

"Genus Cypricardites. Equivalved, profoundly inequilateral: hinge with "four or five unequal cardinal teeth, anterior one largest and most promi- "nent; lateral teeth short, and very remote from the cardinal teeth."

"This genus is allied to Pterinea of Goldfuss, but is never properly "alated, nor has it the very large muscular impressions of that genus: the "cardinal and lateral teeth are also different; the anterior cicatrix is often "deeply impressed; the posterior one not visible in casts of the interior.

"This genus abounds in the Silurian rocks, but I have not seen a species "from any more recent formation."*

Mr. CONRAD describes sixteen species under this genus, among which were included the *C. bisulcata* since described by DE VERNEUIL as the type of the Genus GRAMMYSIA, under the name of *G. hamiltonensis*.

The description corresponds in many respects with that of PALÆARCA, and the illustration given by Mr. CONRAD likewise resembles that genus. Should an examination of the typical species prove the two identical, the later name will give place to that of CYPRICARDITES.

CYPRICARDITES (CONRAD).†

---

* When these remarks were written, the Hamilton and Chemung groups were regarded by the New-York Geologists as Silurian, and as being the equivalent of the Ludlow rocks of England.

† This figure is copied from the original figure of Mr. CONRAD, accompanying his description of the genus in 1841. The plate upon which this occurs was engraved to accompany the Annual Report of 1841 ; but, unfortunately, only a small number were ever distributed, so far as known to the writer. The same plate contains illustrations of the Genera NUCULITES, LYRODESMA, ORTHONOTA, CYRTOLITES, ORTHOSTOMA, DICTYOCRINUS, ASPIDOLITES and DICRANURUS, as well as of one species of PLATYCERAS ; all genera proposed by Mr. CONRAD. At the time I proposed the Genus PALÆARCA in 1847, I had overlooked the description and figure of CYPRICARDITES ; and it is only since the printing of that part of Vol. III, Palæontology of New-York, that my attention has been directed to the subject of the preceding note.

OBSERVATIONS

ON THE GENERA

CAPULUS, PILEOPSIS, ACROCULIA, AND PLATYCERAS.

In the work entitled "Figures and Descriptions of the Palæozoic Fossils of Cornwall, Devon and West-Somerset," by Professor PHILLIPS, published in 1841, he has proposed the Genus ACROCULIA to include certain fossils which had been referred to the Genus PILEOPSIS, and to which, he remarks, they "offer but slight analogy." His description is as follows:

"*Provisional character.* Obliquely spiral; the apex free, the aperture "ample, without columella: a sinus in the right lip."

This generic distinction has been acknowledged by some palæontologists; but, more recently, both Continental and English naturalists have referred all these forms to CAPULUS or PILEOPSIS, which are regarded as synonymous.

Previous to the publication of the work of Professor PHILLIPS cited above, Mr. CONRAD, in his Report on the Palæontology of New-York for 1840 (p. 205), proposed the generic name PLATYCERAS, with the following remarks:

"I propose to group in this genus the *Pileopsis tubifer* (SOWERBY), *P.* "*vetusta* (SOWERBY), the *Nerita haleotis* (SOWERBY), and perhaps *Belle-*"*rophon cornuarietes*. The shells are suboval or subglobose, with a small "spire, the whorls of which are sometimes free and sometimes contiguous: "the mouth is generally campanulate or expanded. I have not seen a species "above the Silurian rocks, though they probably occur above them in Europe*, "and they are never found in the Lower Silurian strata; they characterize "the middle portion of the system."

The generic description of Mr. CONRAD is more comprehensive than that of Professor PHILLIPS, as it includes shells with the volutions free or contiguous. Both authors, however, have designated among the typical forms the *Pileopsis vetusta* of SOWERBY. The species first described by Mr. CONRAD are the *P. dumosum* of the Upper Helderberg limestone, the *P. ventricosum* and *P. gebhardii* from the Lower Helderberg.

The *P. dumosum* is spiniferous, and the volutions in all these are essentially contiguous; but some species subsequently referred by Mr. CONRAD to

* See note on page 9.

this genus have the lower volutions free, and the apex consisting of one or two minute contiguous volutions. From these forms we gradually pass to others where the apex is simply arcuate, and finally to those which are entirely straight. From the large number of species grouped under this designation, it might be doubted whether there is not room for farther separation; but with our present knowledge, it does not appear practicable to draw any lines of generic distinction, and we find, moreover, that some of the species, in their different stages of growth, present a variety of character which might render it difficult to recognize them as identical under all circumstances.

Although possessing numerous casts of some species of this genus, and a large number of shells of several species from the interior of which the stony matter is entirely separated, I have thus far been unable to recognize the peculiar muscular impressions which are characteristic of CAPULUS or PILEOPSIS; and I feel therefore constrained, in the present state of my knowledge, to adopt the generic name PLATYCERAS.

GENUS PLATYCERAS (CONRAD, as emended).

SHELLS depressed subglobose, subovoid or obliquely subconical. Spire small: volutions few, sometimes free and sometimes contiguous, without columella; aperture more or less expanded, often campanulate and sometimes with the lip reflexed; peristome entire or sinuous.

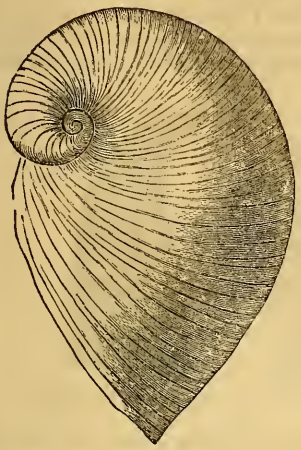
SURFACE striated or cancellated, often spirally ridged or plicate, and sometimes strongly lamellose transversely, nodose or spiniferous.

Many of the species show a sinuosity of the striæ, indicating a notch in the margin of the aperture during the first stages of growth, and this notch sometimes remains in the mature condition. More frequently, however, the earlier sinus is closed, and, in certain species, the margin continues unbroken, while in a few others this sinus is continued to the margin at the final period of growth; but more often it becomes closed at some period during the growth of the shell, and another commenced at some other point, and not seldom two or more are thus begun and continued; while some simply striated species, with a single sinus in their earlier stages of growth, become more or less plicated towards the margin, with several sinuosities in the peristome in the mature condition: usually, however, one or two of the marginal sinuosities are deeper than the others.*

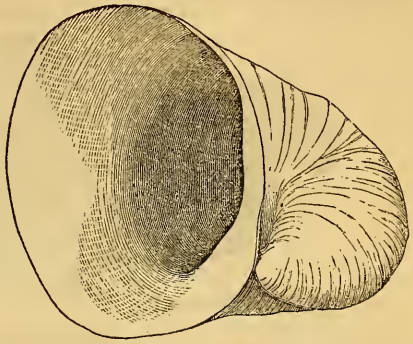
* The variety of form here described, with extensive illustrations of more than forty species in the third volume of the Palæontology of New-York, convey but an imperfect idea of the variety of character and expression presented in an extensive collection of the species of this genus. Since the preceding observations were written and printed (in Vol. III, p. 309), I have examined a collection obtained at Cumberland, Md., in September 1858, and find some specimens which show the

The accompanying figures are illustrations of one of the typical species of Mr. Conrad.

Platyceras ventricosum.



1



2

The following figures are of other species, where the last volution is free, there being one or two closely contiguous turns at the apex : one of them is deeply sinuate at the margin.

Platyceras trilobatum.

Platyceras intermedium.

expansion of the columellar lip, and its partial or entire union with the volution, presenting all the appearance of a thin columella with a deep umbilicus. An approximation to this condition is likewise shown, more or less complete, in some of the figures on Plates 117 and 118, Vol. III, Pal. New-York.

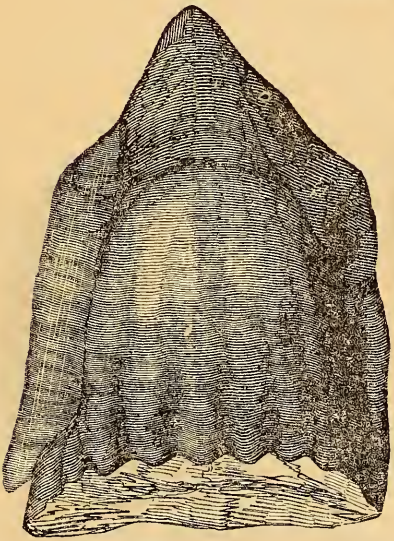
The following figures are illustratrations of two other species; one of them having a single minute close volution at the apex, and the other being simply bent or arcuate. For the latter forms, I had proposed in 1843 the generic name ORTHONYCHIA*; but an examination of a great number of specimens has not shown any reliable character, by which they may be separated from PLATYCERAS.

PLATYCERAS BISULCATUM.

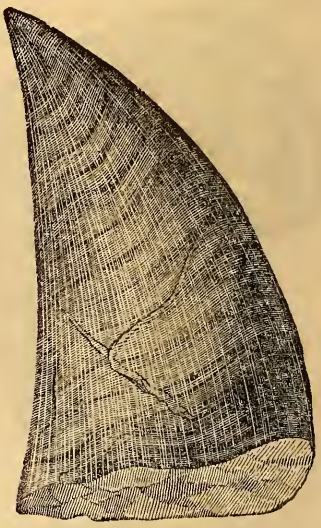
PLATYCERAS SUBRECTUM.

In the farther removed from the spiral forms of this genus, we have the straight and nearly straight species, which, in the striate, cancellate, and plicate surfaces and sinuous peristomæ, still preserve externally the generic characteristics.

PLATYCERAS PLICATUM.



1



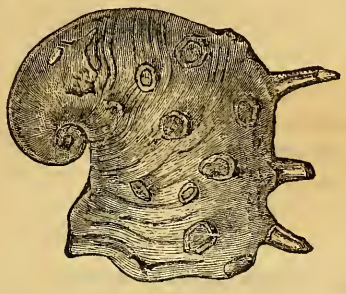
2

Fig. 1. The anterior side of a specimen which is partially crushed.
Fig. 2. The left side of a specimen.

* Report on the 4th District, Geology of New-York, 1843

The preceding figures (with one exception) illustrate some of the numerous varieties of form which occur in the rocks of the Lower Helderberg group, in which, and the Oriskany sandstone together, we know nearly fifty species.

The following species from the Upper Helderberg limestone offers an illustration of the spiniferous forms : the specimen is one of medium size of the *P. dumosum* (Conrad). The larger individuals of this species are sometimes more thickly set with spines ; and in a single individual before me, some of these spines are two inches in length.



Platyceras dumosum.

There are about fifteen species of this genus already known in the limestones of the Upper Helderberg group, some of them approaching in character to those of the Lower Helderberg limestones ; but they never acquire that degree of development, nor the prolific variety of form and number of individuals, which meet us in the latter group of strata.

We already know several species in the Hamilton group, and among them one spine-bearing form ; but the individuals are comparatively rare, and they form but an inconspicuous feature in the fauna of the period.

In the Chemung group, where the calcareous element is greatly subordinate, and the mass consists principally of sands and clays, these forms are exceedingly rare or almost entirely wanting.

In the Carboniferous limestones of the Mississippi valley, we already know some seven or eight species, and a larger number will doubtless be found during the progress of investigations.

OBSERVATIONS

ON THE GENERA

PLATYOSTOMA AND STROPHOSTYLUS.

PLATYOSTOMA.

The Genus Platyostoma was described by Mr. Conrad in the Journal of the Academy of Natural Sciences of Philadelphia in 1842, Vol. viii, p. 275, as follows :

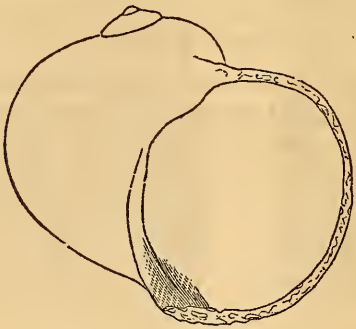
"Platyostoma (Conrad)

"Shell subglobose : spire short; aperture very large, suborbicular, "dilated; labrum joining the body whorl at right angles to the axis "of the shell."

The Platyostomæ are globose shells with low spires, having columella : the last volution is extremely expanded, the aperture very large, and the columellar lip thickened.

These shells are often distorted by pressure to a great extent, and it is not always possible to distinguish the casts of this genus from those of the Strophostylus, or from those of some species of the Platyceras of Conrad.

The *P. ventricosa* is given as the type of the genus, and the accompanying figure is copied from the outline of the shell as given by Mr. Conrad on Plate xvii of the volume cited.



Platyostoma ventricosa.

Under this genus Mr. Conrad described three species, the *Platyostoma ventricosa* and *P. arenosa* from the Oriskany sandstone, and the *P. lineata* from the Hamilton group.

STROPHOSTYLUS.

There are, besides the true PLATYOSTOMÆ, some other shells of not very dissimilar character in the rocks of the Lower Helderberg and Oriskany sandstone periods. Some of these, in the casts and in their exterior conformation, are remarkable for their oblique form and the wide-spreading of the last volution, which is also often exaggerated by pressure in the same direction.

These fossils have sometimes the globose form of PLATYOSTOMA ; but in these instances they are usually more symmetrical, and may be recognized by the smoothly rounded outline and the extreme posterior extension of the peristome on the adjacent volution. The surface is evenly striated by fine elevated threadlike striæ parallel to the lines of growth.

Although differing in external characters from any other gasteropods of the group, I have not until recently had the means of determining the generic relations of these forms. During the past year (1857) I obtained from Cumberland (Maryland), some Gasteropoda of the Oriskany sandstone, among which was a single specimen of one of these shells entire and without adhering stone. This specimen, and some others subsequently obtained, show that the fossils having the character just noticed possess a peculiar form of columella, which is more or less distinctly twisted or folded, or with a broad spiral groove within the outer edge of the columella, and between that and a parallel ridge or callosity.

For these shells I have proposed the generic name *Strophostylus.**

GENUS STROPHOSTYLUS (Hall).

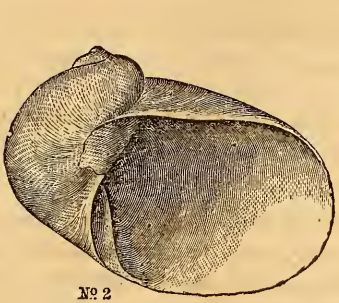
[Gr. στρεψω, *verto* ; στυλος, *columella*.]

GENERIC CHARACTER. Shells subglobose or ovoid-globose. Spire small, with a large ventricose body-whorl; outer lip thin, not reflected (sometimes slightly expanded); columella twisted or spirally grooved within, not reflected; umbilicus none: aperture somewhat round-ovate or transversely broad oval.

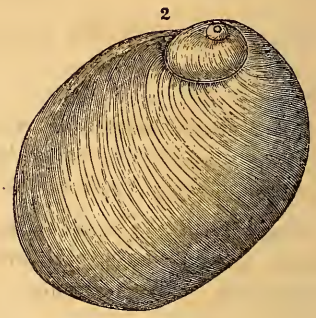
The columella is rarely seen, though I have been so fortunate as to discover it in three species from the Oriskany sandstone; while it is partially exposed in two other species, one of which is from the Ori-

* Palæontology of New-York, Vol. III. p. 303.

skany sandstone, and the other from the limestone of the Lower Helderberg group.

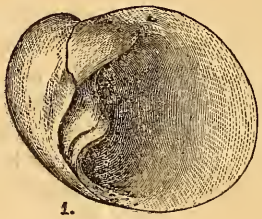


1



2

The figures 1 and 2 are illustrations of well-marked species from the Oriskany sandstone.



3

Fig. 3 is of another species from the same rock, showing the same general character of the columella.

Under this genus I have described the *Strophostylus elegans*, *S. globosus*, *S. obtusus*, *S. depressus*, *S. fitchi* and *S. rotundatus*, from the rocks of the Lower Helderberg group; and *S. transversus*, *S. matheri*, *S. andrewsi* and *S. expansus* from the Oriskany Sandstone.

OBSERVATIONS ON THE GENUS NUCLEOSPIRA.

In Murchison's Silurian System, Mr. Sowerby has described, under the name *Spirifer? pisum*, a species differing essentially in general external characters from the typical forms of that genus. This species has been adopted as a true *Spirifer* in Morris's Catalogue of British Fossils, and in the Nomenclator Palæontologicus of Bronn, as well as elsewhere. Subsequently I discovered in the Niagara shales a form so similar to the British species, that I regarded it as identical; but, from the condition and character of the specimens, I considered them as more nearly allied to *Orthis* than to *Spirifer*, and, accordingly, in the second volume of the Palæontology of New-York, designated the Niagara fossil *Orthis pisum*.

Since that period, my collections from the Helderberg have revealed a species similar to the one from the Niagara group; but among the numerous individuals from the latter rocks, I found several which were clearly furnished with internal spires like the true *Spirifer*, thus separating it from *Orthis* by unequivocal characters. Finding no genus for the reception of these forms, I described the latter as *Spirifer ventricosa;* and it has been so published in my descriptions of new palæozoic fossils in the Report of the Regents of the University upon the State Collections of Natural History.

Farther examination has satisfied me of the impropriety of placing this fossil under either of the genera named, for several reasons. The central depressed line, or narrow sinus, which might be regarded as the mesial sinus of *Spirifer*, is almost equally a character of both valves; the apparent area is not a true area; and the apparent foramen, being merely a depression in the false area, does not correspond to the foramen either of *Spirifer* or of *Orthis*, not opening into the cavity of the shell. The hinge-line is not extended in the manner of these shells, particularly of the former; while the presence of a spire sufficiently distinguishes it from the latter.

The Lower Helderberg group furnishes one, and perhaps two, other species; and I find that the fossil described by me as *Atrypa concinna* in the Report of the Fourth Geological District (1843), is another species belonging to the same group of fossils, in which both the external characters and internal structure differ so essentially from any of the described genera of Brachiopoda as to constitute a distinct genus; and which, from the general nucleolar character of the known species, I propose to designate Nucleospira.

Genus Nucleospira (Hall, 1857).

Spirifer : Murchison, Sowerby, et al.; *Orthis* : Hall.

[Gr. πυρην, *nucleus;* σπειρα, *spira.*]

Shell spheroidal or transversely elliptical, more or less gibbous or ventricose, furnished with internal spires as in *Spirifer* : hinge-line shorter than the width of the shell; cardinal extremities rounded : valves subequal, articulating by teeth and sockets. Ventral valve having the beak extended beyond the opposite valve, and beneath it a triangular depression or area, which sometimes terminates in a shallow spoonshaped pit; on each side of which, at the base, is a strong tooth. A narrow ridge or septum extends along the centre of the inner side of the valve, from beak to base. Dorsal valve furnished with a strong spatulate cardinal process, which, rising vertically from the cardinal margin, is closely grasped at its base by the cardinal teeth of the other valve; and thence bending abruptly upwards, and expanding, is projected into the cavity of the opposite beak, lying close upon the underside of the false area. This process is grooved or depressed in the centre of the upper side, so as to leave between it and the arch of the ventral beak a narrow space for the passage of a pedicle, for the protrusion of which a minute foramen is sometimes observed in the beak. From the sides of this process, above the junction of the teeth of the opposite valve, and at the point where it bends upwards, originate the crural processes which support the spires. A deep cavity beneath the cardinal process extends to the dorsal beak, from which originates a thin elevated septum running to the base of the shell. Muscular imprints confined to a narrow oval space.

Surface apparently smooth; under a lens, punctate : shell structure punctate, and, when perfect, covered with minute hair-like spines.

The larger species of this genus present some analogy in external appearance with *Spirigera*, and the presence of internal spires increases the similarity. The cardinal teeth resemble those of *Spirigera* and *Merista* : the punctate shell and the structure of the hinge are, however, quite different. In form, and in the punctate character, it simulates *Magas;* while the elongate cardinal process of the dorsal valve resembles that organ in *Thecidium*. The genus, however, when regarded in all its features, is very distinct from any of these; and the species will constitute, so far as regards American palæozoic brachiopoda at present known, a well-marked, beautiful, and interesting little group. The geological range of the genus, as

at present known, extends from the Niagara, through the Lower Helderberg, to the Hamilton ; though it is probable we shall find them in other strata.

Under this genus I have described *N. ventricosa*, *N. elegans* and *N. concentrica* from the Lower Helderberg rocks ; *N. pisiformis* (*Orthis pisum*, Pal. New-York, Vol. ii, p. 250), from the Niagara group ; and *N. concinna* (*Atrypa concinna*, Rep. of the Fourth Geol. District of New-York, 1843, p. 200, f. 3), which are the species known to me at the beginning of 1848.

The following figures are illustrations of the structure of the genus, as shown in *N. ventricosa*.

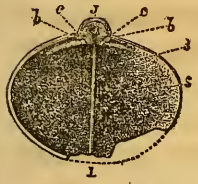


Fig. 1. Interior of the dorsal valve.

j. Cardinal process.
c, *c*. Crural processes.
b, *b*. Dental fossets.
r. Muscular imprints.
s. Medio-longitudinal septum.

Fig. 2. Profile view of the dorsal valve, showing the recurved cardinal process and the bases of the spiral arms.

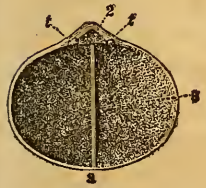


Fig. 3. Interior of the ventral valve.

2. A flattened space or false area beneath the beak.
t, *t*. Teeth.
s. Medio-longitudinal septum.

Fig. 4. Profile view of the ventral valve.

Fig. 5. The interior of the dorsal valve, with a portion of the ventral valve attached. The figure shows the concave or grooved surface of the cardinal process *j*, as if for the passage of a pedicle; the bases of the crura *c*, *c*, coming off at the base of the cardinal process; while the teeth of the ventral valve, *t*, *t*, fitting into the fossets below these, clasp the whole firmly.

FIG. 6. The ventral valve, showing the spires as detached from the dorsal valve, and the arching transverse filament which connects the two a little below their base.

FIG. 7. A longitudinal section of the two valves in their natural relations te each other, showing the cardinal process *j* of the dorsal valve extending beneath the false area of the opposite valve, and curving into the rostral cavity. The crura *c*, from which the spiral arm on one side is shown, first bend a little into the ventral cavity, and then turn abruptly backwards and curve into the dorsal cavity, following essentially the curvature of the valve: about midway between the beak and base is shown one side of the connecting process *l*, which tends abruptly upwards and backwards, terminating in an acute point which is directed towards the free extremity of the descending branch of the crural process. The medio-longitudinal septa *s*, *s*, are of equal elevation in the two valves.

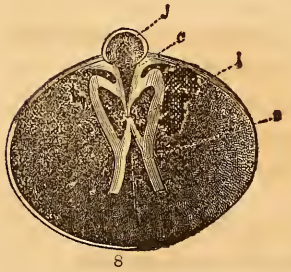


FIG. 8. Dorsal valve, showing the attachment and base of the crura.

These figures are all enlarged three diameters, except fig. 8, which is four diameters. Every part here shown has been clearly seen in specimens of *N. ventricosa*, and the structure is corroborated by specimens of *N. concinna*.

FIG. 9. Dorsal and cardinal views of a specimen of *Nucleospira concinna* (*Atrypa concinna*), from the Hamilton group of New-York.

For farther illustrations of the genus and species, see Vol. iii, Palæontology of New-York, Plate XVIII B.

Genus Trematospira (Hall, 1857).

Spirifer : Conrad, Hall; *Atrypa* : Hall.

[Gr. τρεμα, *foramen*; σπειρα, *spira*.]

Shell transverse, elliptical or subrhomboidal, inequivalve, furnished with internal spires (arranged as in *Spirifer*) : hinge-line shorter than the width of the shell; cardinal angles rounded. Valves articulated by teeth and sockets : beak of ventral valve produced or incurved and truncated by a small round perforation, separated from the hinge-line by a deltidium. A deep triangular pit, or foramen beneath the beak of the ventral valve, which is filled by the closely incurved beak of the dorsal valve. False area sometimes defined.

Surface marked either with strong simple plications or finer fasciculate or bifurcating striæ, which cover also the mesial elevation and depression. Shell structure punctate?

In the extension of the hinge-line, the mesial sinus, the internal spires, and, partially, in the exterior markings, this genus resembles Spirifer and Spiriferina : in the perforate beak, false area, and incurvature of the beak of the dorsal valve beneath the apex of the opposite valve, it resembles Atrypa; while one of the species has the general aspect of Rhynchonella. From Retzia, Spirigera, and Merista, which have similar internal spires, it is separated by external and other important characters. The appearance of an area is deceptive; depending mainly upon a partial displacement of the valves, which presents to view the hinge-line of the ventral valve. This is true of *T. multistriata*, where we find some specimens with an appearance of an area, and others without. The *T. perforata* is clearly without an area, as well as *T. costata*; though the margin of the foramen in the former of these is often defined in such a manner as to resemble a true area. The broad triangular foramen or pit for the reception of the beak of the dorsal valve is a constant and conspicuous feature. This pit does not appear to be like the foramen of *Spirifer*, an opening into the cavity of the valve, but is spoonshaped, somewhat like that of *Pentamerus*; its lateral walls in *T. multistriata* having been traced for some distance below the margins, apparently converging towards each other.

The known species present the variety of surface marking, respectively, of simple costæ, strong angular striæ in fascicles, and finer somewhat rounded bifurcating or simple striæ. Specimens of each are rare; and of *T. costata*, but a single one was found among collections continued uninterruptedly through a period of ten years, and a second specimen has since been obtained. The condition of the specimens is such as not to admit of satisfactory investigations of the interior, which must for the present remain partially undetermined.

The species positively determined to the present time are from the rocks of the Lower Helderberg group; to which may be added the *Trematospira* (*Atrypa*) *camura* of the Niagara group, which presents some slight deviation in the perforation of the beak, and a species from the Hamilton group which is apparently of the same genus.

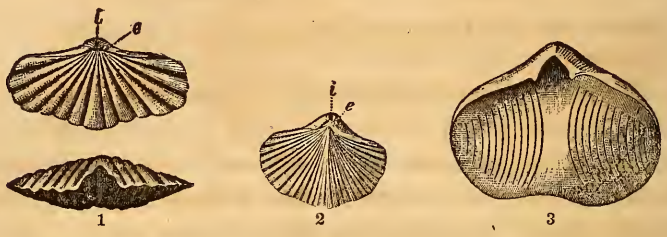


Fig. 1. *Trematospira costata.* Dorsal and front views.
Fig. 2. *T. perforata.* Dorsal view.
Fig. 3. *T. multistriata.* The ventral valve, from which the dorsal valve has been ground away, showing the spires as they appear on the polished surface of the stone.

Fig. 4. Ventral and front view of *T. multistriata.*

Geological range. Admitting the species from the Hamilton group as of the same genus, its range is from the Niagara group to the Hamilton group, or from near the base of the Upper Silurian to the middle of the Devonian period.

The following species have been described:

T. perforata,
T. multistriata,
T. costata,
T. simplex,
T. simplex var. from the Lower Helderberg group;
T. camura, from the Niagara group.

Genus Rhynchospira (n. g.).

[Gr. ῥυγχος, *rostrum*; σπειρα, *spira* : in allusion to its similarity in form to Rrynchonella, and having internal spires.]

Terebratula and *Rhynchonella* of authors.
Waldheimia : Hall, 1856.
Trematospira, Subgenus *Rhynchospira* : Hall, 1857.
Rhynchospira : Hall, 1858.

Shell longitudinally ovate or subglobose, more or less gibbous, acute or obtuse at the apex. Valves subequally convex; mesial fold not strongly defined, one, two, or more smaller plications usually marking the centre of each valve : beak of the ventral valve perforate, the perforation generally well defined, the lower formed by a deltidium which separates it from the umbo of the opposite valve.

Surface radiatingly plicate or striate : shell-structure punctate or striato-punctate?

Valves articulating by teeth and sockets; the crura supporting two conical spires, which occupy the greater part of the cavity of the two valves. The cardinal process of the dorsal valve is a broad subemarginate plate, spreading laterally and a little recurved at its basal margins, where it is clasped by the teeth of the opposite valve, and extends beneath the deltidium, lying close against the inner surface of that part of the ventral valve.

The mode of articulation, as now determined, is very similar to that of Nucleospira; but the cardinal process is proportionally shorter and emarginate at the extremity, the perforation of the beak large and distinct, while the form is different and the exterior surface plicate or striate, and not punctate as in that genus.

The form of the species is not unlike *Rhynchonella*, but usually more symmetrically rounded, and with less distinct mesial sinuosities. In these characters they resemble Waldheimia, to which genus I had originally referred them until the discovery of the internal spires.

Several of these shells bear a close resemblance, both in the general form and in the interior spires, to Retzia; but the dorsal valve never presents the straight extended hinge-line, nor the ventral valve the short area, common to the carboniferous species of that genus.

From the external characters of the species referred by me to *Atrypa aprinis*, Palæontol. New-York, Vol. ii, pa. 280, pl. 57, f. 7 (= *Terebratula aprinis*, M. V. K. Geol. Russia and the Ural Mountains, Vol. ii, pa. 90, pl. x, f. 10), I infer that it belongs to this genus.

The accompanying figures illustrate the principal characters shown in the typical species *R. formosa.*

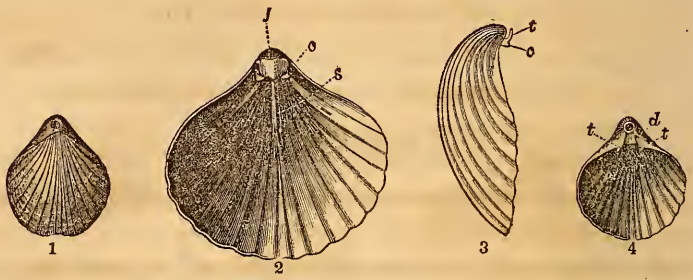


Fig. 1. Dorsal view of a specimen, natural size.

Fig. 2. Interior of the dorsal valve enlarged two diameters, to show the broad cardinal process *j* which covers the extremity of the beak, the bases of the crura *c*, and the short medio-longitudinal septum *s*.

Fig. 3. Profile view of the same, showing the cardinal and crural processes.

Fig. 4. Interior of the ventral valve, natural size, showing the teeth, the deltidium, and the foramen.

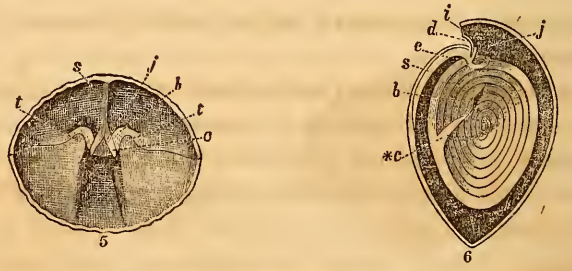


Fig. 5. The upper part of the two valves connected in their natural relations to each other, showing the teeth, the ventral valve below, the sockets, base of crura, cardinal process, and septum of the dorsal valve.

Fig. 6. Longitudinal section, showing the foramen, the deltidium and the cardinal process of the opposite valve lying beneath it; the crura, first bending downwards, and then recurved into the dorsal valve and its continuation in the spire, with the descending process *e*, which forms, with the opposite one, a connecting filament between the two spires.

The following species, published in the Report of the Regents of the University for 1856, may be referred to this genus.

Waldheimia	*globosa*	=	Rhynchospira	globosa ;
W.	*formosa*	=	R.	formosa ;
W.	*deweyi*	=	R.	deweyi ;
W.	*rectirostra*	=	R.	rectirostra.

See also the same species described in the Palæontology of New-York, Vol. iii, pages 215, 216 & 217, Plates XXXVI & XXXVI A.

Geological range. The species at present referred to this genus are from the Niagara and Lower Helderberg groups; while I have a single analogous form, not yet fully determined, from the Hamilton group.

Genus Tropidoleptus (Hall).

[Gr. τροπις, *carina*; λεπτος, *tenuis* : the carinate ventral valve and shallow visceral cavity, in its analogy with Leptæna.]

Strophomena : Conrad.
Leptæna : Hall, Owen, and others.
Tropidoleptus : Hall, Regents' Report for 1856; Palæozoic Fossils, 1857.

Shell transversely oval or longitudinally semielliptical, one valve convex and the other concave, articulating by teeth and sockets; hinge-line equal to or less than the greatest width of the shell. Ventral valve with a linear area and triangular foramen or notch in the margin of the area : from the inner edges of this proceed the dental lamellæ, which are separated from the area by a narrow groove strongly crenulated on the outer edge and extending obliquely outwards, terminating in a low ridge which partially surrounds the muscular impression. Dorsal valve concave; the cardinal process prominent, somewhat wedge-shaped, obtuse at the outer extremity, and diverges in the interior, supporting the bases of the crura. Dental fossets crenulate.

Surface plicate : shell-structure punctate.

The *Strophomena carinata* of Conrad is the type of this genus, and the only species determined at the present time (See Report of the Regents for 1856, page 111).

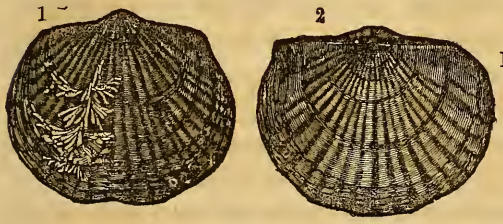


Fig. 1 & 2. The exterior of the ventral and dorsal valves of a large individual. The ventral valve is partially covered by a bryozoum.

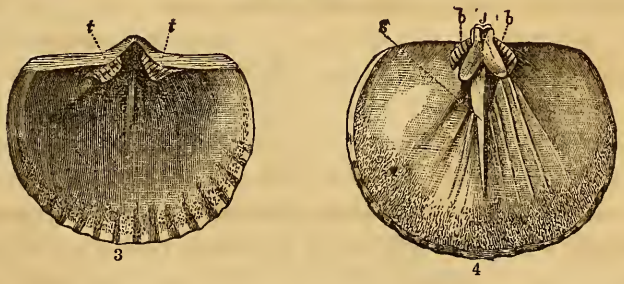


Fig. 3. The interior of the ventral valve, showing the area, foramen, teeth, etc., enlarged.

Fig. 4. The interior of the dorsal valve, showing the cardinal process, the dental fossets, the bases of the crura, and the septum.

Genus Leptocœlia (Hall, 1856).

[Gr. λεπτος, *tenuis*; κοιλια, *venter*, in allusion to the shallow visceral cavity.]

Terebratula and *Rhynchonella*, in part, of authors.
Atrypa : Conrad, Hall, et al.
Leptocœlia : Hall, Regent's Report for 1856.

Shell inequivalved, variable in form, usually semioval or subcircular, transverse or elongate, plano-convex or concavo-convex : hinge-line sometimes equal to the greatest width of the shell. Ventral valve convex or subangular in the middle, with beak more or less extended, moderately incurved; foramen terminal, the lower side formed by two deltidial pieces. Dorsal valve flat or concave, or depresso-convex. A mesial fold and sinus usually existing, but not often prominent. Structure of shell lamellose or fibrous, not punctate.

Valves articulating by means of two strong teeth in the ventral, inserted into sockets in the dorsal valve, which are mainly excavated in the base of a strong cardinal process : teeth converging, denticulate, with corresponding denticulations in the sockets. Muscular impressions marking a large oval or flabelliform area, with a thin median septum : adductor imprints small.

The dorsal valve is marked by a strong cardinal process, at the base of which, on each side, are the deep oblique dental fossets; and from the inner margins of these proceed the crural processes, supported below by thickened plates which extend obliquely for a short distance towards the middle of the shell, bordering the muscular impression. The muscular impresion forms a suboval space, divided through the middle by a low median septum.

The crura, in their extension, are united in a flattened disk, which terminates at its remote extremity in an acute point; and on the centre of the cardinal side of the disc there is a slender process extending downwards, while near the junction of the crura with the disc there is, on each side, a slender descending process continued into the cavity of the ventral valve. The cardinal process, in its central portion, is thickened at first and divided in the middle, but, in old shells, gradually filling the passage to the foramen, and sometimes by a prominent point in the centre entirely dividing the passage.

The hinge-line is often much extended, and in the dorsal valve nearly straight to the cardinal angles. There is sometimes the ap-

pearance of a false area on the ventral valve, somewhat similar to Atrypa, the margin being thickened and grooved; but this does not appear to be a characteristic or constant feature.

The specimens of the interior, which have fallen under my observation, usually preserve only the short crural processes; and it is in one specimen alone, which is partially filled with crystalline matter, that distinct cavities can be seen corresponding with what I have described. The crystalline matter was first deposited upon these internal organs, which have subsequently almost entirely decomposed, leaving in the cavities fragments of the substance, showing the original form of the crura and appendages.

The shells of this form have been described as Terebratula, and more recently have been included with Rhynchonella, from which they differ conspicuously in the great inequality of the valves and the extension of the hinge-line, as well as in their internal structure.

The accompanying illustrations show all that has been thus far determined relative to the internal structure of this genus. Figures 1, 2 and 4 are from specimens of *L. flabellites;* and fig. 3 is a nearly perfect specimen of *L. fimbriata.*

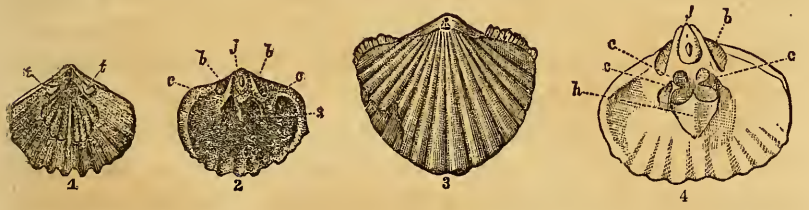


Fig. 1. The interior of the ventral valve, showing the cardinal teeth and the muscular impression.

Fig. 2. Interior of the dorsal valve, showing the cardinal process *j*, the teeth sockets *b b*, the bases of the crura *c c*, and the short thickened septum which divides the muscular impression.

Fig. 3. An enlarged figure of *L. fimbriata*, showing the usual form, the foramen at the beak, and the fimbriæ on the cardinal margin.

Fig. 4. The interior as shown in a specimen of *L. flabellites*, where it has been partially filled with crystalline quartz. The decomposition of the crura, loop, and the flattened disc, have left cavities of the same form in the quartz, and small portions of the substance of some of these parts still remain. The specimen is a dorsal valve which retains the matter formerly filling the shell, and it is seen from the ventral side.

I have heretofore referred to this genus the *Leptocœlia* (*Atrypa*) *disparilis* of the Niagara group, the *Terebratula lepida* of Goldfuss, the *T. sublepida* and *T. duboisii* of MM. Murchison, de Verneuil and Keyserling (Geology of Russia and the Ural Mountains). The *L. concava* and *L. imbricata* of the Lower Helderberg group are analogous forms, which have been referred to this genus. The *Atrypa hemispherica* of Murchison is apparently a characteristic form of this genus, as well as

the *A. planoconvexa*, both of the Clinton group*. The internal structure, however, has been determined from the species of the Oriskany sandstone and Lower Helderberg specimens, but mainly from the former.

In its hinge-structure it approaches TROPIDOLEPTUS ; but the hinge-line of the dorsal valve is never so far produced, while the beak is much more extended. In TROPIDOLEPTUS there is a distinct linear area, and the teeth and sockets are crenulated; the form and character of the muscular impressions are different, and the structure of the shell is punctate.

Geological range. The genus begins its existence as low down in the system as the Clinton group, and extends through all the members of the series to the limestones of the Upper Helderberg, and perhaps above that point.

OBSERVATIONS ON THE GENUS EATONIA.

IN the Annual Report on the Palæontology of New-York for 1841, Mr. CONRAD described and figured a species of brachiopod from the Oriskany sandstone under the name of *Atrypa peculiaris*†. A similar species was described by Mr. VANUXEM, in his Geological Report in 1843, under the name of *Atrypa singularis*‡, from the shaly limestone of the Lower Helderberg group.

These species are both remarkable in their form and exterior surface markings; having one valve deeply sinuate on its anterior margin, and the other with a long linguiform extension filling the sinuosity, while the surfaces are finely marked by radiating striæ. A third species, described by Mr. VANUXEM as the *Atrypa medialis*, was placed in the same group with the two preceding, though the external appearance would scarcely justify such an arrangement.

In the course of continued collections in the Helderberg, numerous casts of these species were obtained; and it became apparent that they possessed a peculiar internal structure, leaving upon the casts similar muscular and vascular impressions. For these forms I proposed, in 1856, the name EATONIA‖, describing several species. The genus may be characterized as follows :

---

* The last-named species presents some differences in the hinge-structure, which may prove of sufficient importance to unite the lower group of species under another generic designation.

† Annual Report on the Palæontology of New-York, 1841, pa. 56, pl. f. 11.

‡ Report on the Third Geological District of New-York, 1843, p. 120, f. 3.

‖ Report of the Regents of the University on the State Cabinet of Natural History for 1856: Also New Species of Palæozoic Fossils, 1857.

Genus Eatonia* (Hall, 1856).

Terebratula, in part, of authors.
Atrypa : Conrad, Vanuxem, Hall, and Mather.
Rhynchonella, in part, of authors.

Shell oval or ovoid, subcircular, elongate or transverse. Valves very unequally convex, with a strongly developed mesial fold and sinus. Beak of the ventral valve perforate.

The ventral valve is usually nearly flat or slightly convex near the beak, flattened or concave in the middle, with a broad deep sinus extending thence to the front of the shell; the anterior extension being often turned at right angles to the plane of the longitudinal axis. Beak small, elevated and closely incurved over the umbo of the opposite valve, perforate : no area. Dorsal valve convex, often ventricose, with a deep sinus in the anterior margin. Valves articulating by teeth and sockets; the anterior and antero-lateral margins often crenulate or plicate within. The cardino-lateral margins of the ventral valve are usually angularly inflected, and embraced within the edges of the dorsal valve.

The valves articulate by means of two teeth in the ventral valve with corresponding sockets in the dorsal valve, and a medio-longitudinal ridge in the ventral valve which is more or less completely embraced between the deeply bifurcating cardinal process of the dorsal valve, which forms part of the apophysary system.

The dorsal valve has a prominent bifurcating cardinal process, the branches of which, slightly diverging, form the first or lower crural processes, which are directed upwards and inwards, or, when the valves are closed, are directed into the muscular cavity of the ventral valve (their upper surfaces slightly grooved)†. Below these first processes, and proceeding from the origin of the thickened cardinal process, another pair of crura are directed inwards, and gently curve towards the first, the medio-longitudinal ridge being continued to the centre of the valve; and on each side, from these

* *In memoriam* Professor Amos Eaton, Principal of the Rensselaer School in Troy, from its establishment in 1824, to his death in 1842.

† These processes correspond precisely with what are termed the crural processes in Rhynchonella, and do not differ materially from the corresponding parts of *Rhynchonella psittacea*, except in their prominence or extension beyond the cavity of the shell as shown in the figures. In the older shells, at least, this process is deeply bifurcate, and grasps the medio-longitudinal septum of the ventral valve, giving additional strength to the hinge. The ultimate extension and form of these processes is still undetermined. Separate valves of the species of this genus are rarely observed, even in positions where the entire shells are common, and where they would have been preserved had they been readily separable like many others.

second crural processes, a ridge proceeds along the inside of the shell nearly parallel to the margin. This ridge, or thickening of the shell, marks the extent to which the margin of the ventral extends within the edge of the dorsal valve.

In the ventral valve, the two strong teeth proceed from the thickened margin of the valve; and below these, but not distinctly connected with them, are lamellæ, which, extending into the cavity of the beak, continue downwards, forming an elevated rim around the deep muscular impression. This elevated rim, which is convergent, grasps the neck of the cardinal process of the opposite valve in its narrowest part between the two pairs of processes (figures 1, 2, 3, and 6).

The muscular area is longitudinally oval, with a strong median plate, which, about halfway from the beak to the base of the muscular impression, spreads laterally and becomes slightly raised from the shell, leaving a little cavity beneath it; and in this, and below its edge, are the cordiform adductor imprints*. The median ridge is continued below this point, but less prominently than above. When the muscular impression is perfectly preserved, it is radiatingly plicated towards the margin in all the species observed. The casts of the ventral valve show the form of this muscular impression in strong relief, and, in well-preserved specimens, the small adductor impression projects a little above the level of the other part.

The muscular impression in the dorsal valve is somewhat central, oval or cordiform; beginning sometimes a little above the termination of the median septum, and sometimes nearer the beak, and expanding towards the front of the shell. This impression is margined by a slightly elevated rim, and in some species there is a double rim.

The points of similarity with RHYNCHONELLA will at once be observed on comparison of this description with that of the former genus, or on comparison with the fossils themselves. The most striking difference in the ventral valve is the absence of dental plates, strictly speaking; though these are represented in the elevated lamellæ surrounding the muscular impression, which is much stronger and differs in some respects from that of *Rhynchonella*. In some of the palæozoic Rhynchonellæ there are no dental plates visible, and the muscular depression is but faintly defined. In the median septum of the ventral valve, which in the older shells articulates with the central process of the opposite one, there is a character not observed in *Rhynchonella* proper. The most conspicuous difference, however, is in the dorsal valve and its four crural processes, which differ essentially from *Rhynchonella* and every other brachiopod known to me.

* See figures 3 and 4, page 37.

I have not discovered the deltidial plates, though they have probably existed. The foramen appears to be formed on the lower side by the umbo of the opposite valve, and, in the young state, there is room for the protrusion of a small pedicle; while in older shells, where these parts have been seen, there appears to be a thickening of the shell, and a closing of the passage to the beak.

The surfaces of these shells are radiatingly striate or plicate; one of the most conspicuous external features being the broad deep sinus on the lower half of the ventral valve, and the abrupt bending of the front of the shell.

Geological range. Hitherto I have not distinguished any species in the Lower Silurian rocks; and, in the State of New-York, those already known are confined to the Lower Helderberg group and the Oriskany sandstone.

Under this genus, the *Eatonia medialis*, *E. eminens*, *E. singularis* and *E. peculiaris* are described on pages 241, 242, 243 and 244 of the Palæontology of New-York, vol. iii; and *E. pumila*, *E. whitfieldi*, and *E. sinuata*, on pages 437 and 438 of the same volume.

The following figures are from specimens of *Eatonia peculiaris*, and illustrate the more important features of the genus.

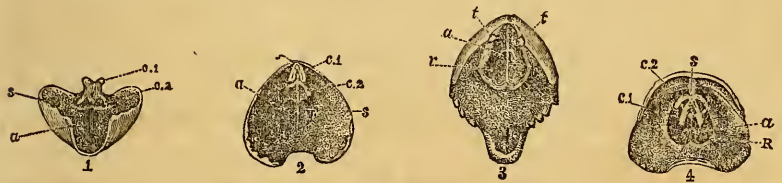


Fig. 1. The dorsal valve in profile, showing the deep sinus in front, the crural processes (*c* 1 and *c* 2), the median septum (*s*), and muscular impression (*a*).

Fig. 2. The dorsal valve, looking vertically into the interior. The upper crural processes (*c* 2) are not quite sufficiently divergent.

Fig. 3. The ventral valve, showing the form of the muscular impressions (*a*, *R*) and the teeth (*t*).

Fig. 4. The ventral valve preserving a part of the dorsal valve attached, showing the first crural processes (*c* 1) extending into the muscular cavity. The extension of the shell in front is broken off, to show the interior.

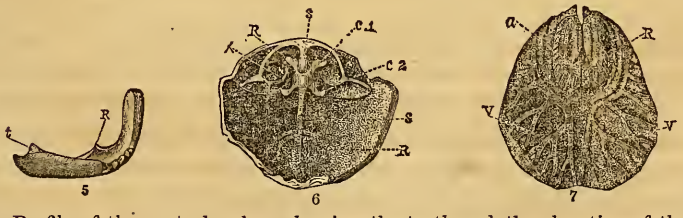


Fig. 5. Profile of the ventral valve, showing the teeth and the elevation of the shell at *R*, the lower limit of the muscular impression.

Fig. 6. Another specimen (the figure enlarged) with the dorsal valve downwards, showing the median septum of that valve (*s*), and the crural processes with the median septum of the ventral valve (*s*) embraced between the processes (*c* 1). The muscular cavity of the ventral valve (*R*) is limited by inflected lamellæ, which embrace the neck of the cardinal process of the dorsal valve.

Fig. 7. A cast of the interior of the ventral valve, showing the muscular and vascular impressions.

OBSERVATIONS ON THE GENUS RENSSELÆRIA.

THE species which I have grouped under this designation, have, in some of their forms, been described as TEREBRATULA, ATRYPA and PENTAMERUS, and more recently I have referred them to MEGANTERIS; to neither of which genera do they belong. One of the most common species in the Oriskany sandstone attracted attention in the collections which were made at the Helderberg mountains forty years ago, and specimens are preserved in the "Clinton Collection" of the Albany Institute. Professor AMOS EATON, in his Geological Textbook published in 1832 (p. 45), recognizes two species which he notices as *Terebratula ovoides* and *T. perovalis;* but since he remarks that they are found "also in all parts of Europe in the same rock," it is to be presumed that he regarded these forms as identical with the European species of the same names.

In 1839, Mr. CONRAD described the more common form from the Oriskany sandstone as *Atrypa elongata**; a name adopted by the geologists of New-York, and perpetuated in their reports. He also describes a species of this genus, from the Lower Helderberg group, as *Atrypa æquiradiata*†.

In 1843, Mr. VANUXEM described a species of this genus, from the Upper Helderberg limestone, as *Pentamerus elongata*‡.

These fossils, though presenting considerable variety when compared in their extreme forms, nevertheless constitute a very natural and beautiful group, easily recognized both in their external and internal characters||.

---

* Annual Report on the Palæontology of New-York, 1839, p. 65.

† Journal of the Academy of Natural Sciences, Vol. viii, 1842, p. 266.

‡ Geological Report of the Third District of New-York, 1843, pp. 132 & 133, f. 1.

|| In 1855, after having studied the exterior of the shell and its structure, together with the casts which I had obtained in New-York, I proposed for these fossils a distinct generic designation; but receiving, soon after, Mr. DAVIDSON's paper "On the systematic arrangement of recent and fossil brachiopoda," published in the Annals and Magazine of Natural History for December 1855, I observed for the first time, in the accompanying improved table of genera, the name of *Meganteris* (SUESS), with a reference to *Terebratula archiaci* as the type of the genus. The figure given in the Palæontographica so much resembles the casts of some of the Rensselæriæ, that I inferred the two to be identical, and have thus described these fossils in my paper published in the Regents' Report for 1856 (Palæozoic Fossils, 1857); and it was not until recently (1858) that my correspondence with Mr. DAVIDSON and Mr. SUESS, and the reception of the paper of Mr. SUESS on the Genus MEGANTERIS, with illustrations, has satisfied me that this genus is quite distinct from the RENSSELÆRIA.

Genus Rensselæria* (Hall).

Terebratula : Eaton, 1834 – 1842.
Atrypa : Conrad, 1839.
Pentamerus : Vanuxem, Hall, 1843.
Atrypa : Vanuxem, Mather, Hall, 1843.
Meganteris : Hall, 1856 & 1857.
Rensselæria : Hall, 1858.

Shell inequivalved, oval, ovoid or suborbicular, elongated or rarely transverse and sometimes subtriangular, generally gibbous or ventricose. Valves more or less convex, without mesial fold or sinus : beak prominent, acute, more or less incurved; foramen terminal, sometimes concealed, round or oval, the lower side formed by two small deltidial pieces, and, in their absence, by the umbo of the opposite valve, and then appears triangular. Shell-structure distinctly punctate.

Surface radiatingly striated or finely plicated, rarely smooth?

Valves articulating by two somewhat widely separated teeth in the ventral valve, with corresponding sockets in the dorsal valve. The diverging cardinal teeth supported by strong dental plates, which, on their anterior margins, extend about half the depth of the cavity of the valve, when they turn abruptly towards the beak, and approach each other or unite in the rostral cavity : from this point of return, there is a low ridge bounding the muscular area, which is an elongate more or less oval depression, in the centre of which the adductor muscles occupy two small narrow scars; a more or less prominent median septum extends the entire length.

In the dorsal valve, the dental sockets lie between the shell proper, and a strong, often much thickened process, from the anterior extension of which proceed the slender crural processes, first in a direct line, and then one division of each, diverging into the centre of the ventral valve, terminate in acute points. On the other side the divisions extend nearly at right angles to the axis of the shell, into the cavity of the dorsal valve; and thence bending abruptly forward and gradually converging, terminate above the centre of the shell in a thin flattened or longitudinally concave plate, which, at its remote extremity, ends in an acute point, the whole being lan-

* I have given this generic designation to commemorate the name of the late Hon. Stephen Van Rensselaer, to whose munificence we owe the early geological and agricultural surveys in the State of New-York; and to whose liberality, in establishing the Rensselaer School for teaching the sciences with their application to agriculture and the arts, I conceive is due the great impulse given to the study of the natural sciences, at a period when these pursuits were little fostered in any of our institutions of learning; and if the results of the Geological Survey in New-York are entitled to any pre-eminence, we are indebted to this early influence more than to any other cause.

ceolate or hastate; and from the centre of the concave margin between the crura issues a slender process, which penetrates into the cavity of the ventral valve. This process, with the two first described as extending into the cavity of the ventral valve, sometimes reach nearly to the inner side of the shell, the three gradually converging to the extremities which are near together. This peculiar apparatus is not attached to any median septum; and the plate is left without any support, except from the slender crura.

The cardinal process at the base of the crura is often much thickened, and sometimes extends forward into the shell much more than in others; and when it becomes thickened in old shells, is often distinctly marked by two grooves upon its summit. Behind this process and between it and the beak, there is a distinct round foramen communicating beneath with the interior cavity of the valve. The points for the attachment of adductor muscles in the dorsal valve are double.

The internal structure described has been fully determined in two species, and partially seen in others. In one species, twenty or more individuals have shown it, with some slight variations in the form of the longitudinal plate, as illustrated in the figures on Plate CVII, Palæontology N.Y. Vol. iii.

The shells of this genus are usually oval or ovate in outline, and often very ventricose; some species varying greatly in their different stages of growth. At present, I know of but a single exception to the form mentioned.

In the greater number of species, the lateral margins of the shell are bent abruptly inwards, often at right angles, or still more abruptly, so as to leave an angular groove along the margin of the united valves. This character is sometimes seen in the young shell, while often it appears only in the more advanced stages of growth. The species vary greatly in size, ranging from the smallest to nearly that of the largest brachiopod of this general form in the palæozoic rocks. The largest specimens figured have a length of three inches, and I have fragments of others which have been much larger.

The geological range of the genus, as at present known, is from the upper part of the Lower Helderberg group, through the Oriskany sandstone, and into the Upper Helderberg limestones.

In its geographical range, it is known from Gaspé in Canada East, to Virginia and Tennessee (and probably occurs in Alabama), and westerly from New-York through Canada West, Mackinac island, Ohio, Illinois and Missouri.

The accompanying figures illustrate the characteristics of the genus, as shown in two species.

Rensselæria suessana.

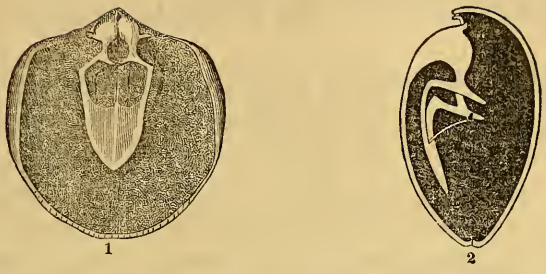


Fig. 1. The dorsal valve, showing the thickened processes at the base of the crura, the dental fossets, and the minute foramen at the beak. The descending processes, and the abrupt bending of the crura which are joined in a plate below with the slender central process, are all shown in the specimen from which this figure is made.

Fig. 2. A diagram presenting a profile view, showing the relations of the parts described.

These figures are enlarged to about one and a half diameters.

Rensselæria ovoides.

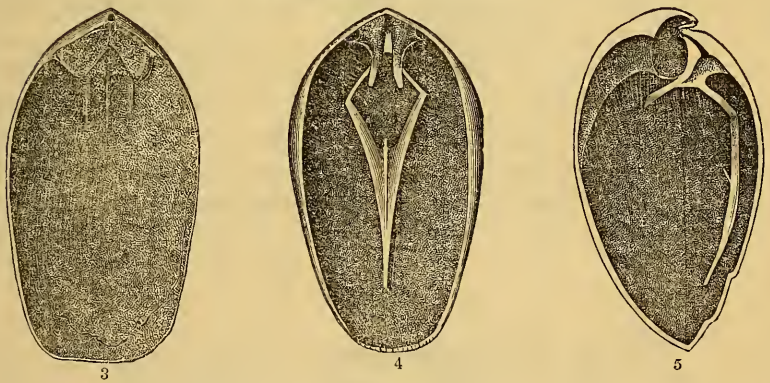


Fig. 3. Interior of the ventral valve, showing the foramen, the large dental lamellæ, muscular impressions, etc.

Fig. 4. The interior of the dorsal valve of the same species, showing the thickened processes at the beak, the crura, the loop and the narrow longitudinal plate, which together so much resemble a bird's tongue with the hyoid bones.

Fig. 5. A diagram presenting a longitudinal section of the two valves, showing the crura, the descending process, etc. The dark line in the dorsal valve, between the base of the crura and the shell, indicates the foramen described as extending from the beak into the cavity of the shell beneath the bases of the crura. In the ventral valve a low medio-longitudinal septum is shown; while the darker and more elevated ridge is a continuation from the base of the dental lamellæ, which limits the muscular area.

OBSERVATIONS ON THE GENUS CAMARIUM.

Among the fossil species referred by me to the Genus Merista, and published in the Report of the Regents of the University in 1856 and 1857, and printed in the Palæontology of New-York, vol. iii, in the latter year, are several which, although possessing the general external form of *Merista*, present nevertheless some noticeable peculiarities. One of these is the strongly incurved beak of the ventral valve, while the cardinal margin is abruptly bent inwards, leaving an angular or subangular ridge extending from the beak to the margin of the shell, the space between this and the cardinal margin being sometimes flattened about halfway to the base. The front of the shell is often produced in a broad linguiform extension of the ventral valve : there is sometimes no depression on the middle of the valve, and sometimes a strong angular sinus. Some separated valves of specimens from Maryland show an arching transverse septum below the rostral cavity, rising from the inner surface of the shell and leaving a deep pit beneath.

The casts present an appearance somewhat as if there had been a double rostral cavity, one below the other. Although the internal structure is but partially determined, I can have no hesitation in separating it from the more abundant forms which I have recognized as *Merista;* and I have proposed for these fossils the generic designation of Camarium.

Genus Camarium (n. g.).

[Gr. *καμαρα*, *fornix*, in reference to the arching septum.]

Terebratula and *Atrypa*, in part, of authors.
Merista, in part : Davidson, Hall, and other authors.
Camarium : Hall, 1858.

Shells ovoid or elliptical, and sometimes depressed subglobose : valves articulating by teeth and sockets; beak of ventral valve perforate. Interior of ventral valve marked by an arching transverse septum about one-third the distance from beak to base. The inner surface of the shell, above and below the septum, marked by muscular imprints : structure of the crura, etc. of the dorsal valve unknown.

Surface marked by fine concentric striæ; and partially exfoliated specimens show some obscure radiating striæ.

Ventral valve flat or sinuate in the middle, and produced in a linguiform extension in front.

From the similarity of structure, I have presumed these forms to belong to the same group as *Spirigera* and *Merista;* but the presence of the transverse septum seems incompatible with the existence of the internal double spires.

Under this genus I include *Merista princeps* and *M. meeki* (Pal. N.Y. Vol. iii, pp. 251 & 252, excluding figures 1 – 3, which may be regarded as doubtful). I have not yet been able to determine the internal structure so far as to make satisfactory comparisons with similar parts of *Camaraphoria.*

The following generic illustrations are from *Camarium typum* of the rocks of the Lower Helderberg group, associated with the *Pentamerus galeatus* and other well-known species.

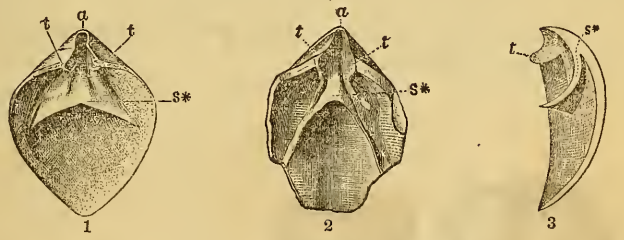


Fig. 1. Interior of a ventral valve, showing the arching septum.
Fig. 2. A similar specimen where the septum is more extended down the sides of the shell : the upper part is somewhat broken.
Fig. 3. Longitudinal section of the ventral valve.

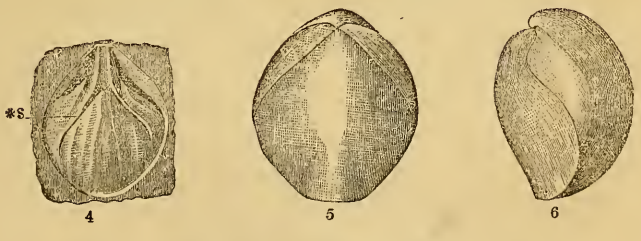


Fig. 4. A cast from the interior of fig. 1.
Fig. 5. Dorsal view of a perfect specimen.
Fig. 6. Profile view of the same.

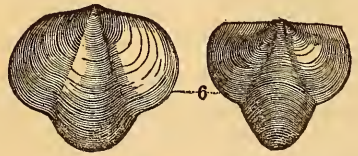
GENUS TRIPLESIA (Hall, 1858).

[Gr. τριπλασιος, *triplex*, in reference to the trilobate character of several of the species.]

SHELLS transverse or elongate, trilobate or subtrilobate; the ventral valve being marked by a broad deep sinuosity, and the dorsal valve by a corresponding fold. Hinge-line straight : area small; foramen triangular. External surface concentrically striated, and with fine obscure or obsolete radiating striæ : internal structure not determined.

I have proposed this name to include *Atrypa extans*, *A. cuspidata*, and *A. nucleata* of Vol. i, Palæontology of New-York, as well as other species. An examination of *Atrypa extans* has shown the existence of a narrow area and small triangular foramen as in *Spirifer;* but I have not been able thus far to determine the internal structure. The texture of the shell, and surface marking, although differing in some particulars from those of *Merista*, are nevertheless similar.

TRIPLESIA EXTANS.



1

Fig. 1. Ventral valve.

2

Fig. 2. Dorsal valve.

3

Fig. 3. Area and foramen of the ventral valve.

NOTES UPON THE GENUS GRAPTOLITHUS;

WITH REMARKS UPON SOME OF THE SPECIES, THEIR MODE OF GROWTH, AND MANNER OF REPRODUCTION.

[Supplement to Volumes I & II of the Palæontology of New-York.]

The short time allowed, and the limited means at my disposal, for the investigations and collections for the first volume of the Palæontology of New-York, prevented that careful and continued examination of many of the fossiliferous beds which becomes so desirable in the present state of the science and the requirements of geology*. Notwithstanding this, however, fifteen species of Graptolites were determined, ten of which were at that time new; while of those identified with European species, we may still raise the question as to positive specific identity, and, with the addition of new material, the subject at this time requires a thorough revision. At that time the peculiar branching forms of the genus were first made known, and, so far as I am aware, a greater variety of form and character illustrated than had previously been observed.

Two other species from the Clinton group were described in the second volume of the Palæontology of New-York, one of these being referable to the Genus Gladiolites. In the same volume I described the Genus Dictyonema, referring it to the Family Graptolitideæ.

In a short paper published in the Proceedings of the American Association for the Advancement of Science for 1849, I stated that the Graptolites were not represented in the higher Silurian, Devonian or Carboniferous strata. Subsequently, in the same year, however, I determined the Genus Dictyonema to belong to the Graptolitideæ; and this opinion was expressed in the second volume of the Palæontology of New-York in 1850 (though the volume was not published till 1852). The Dictyonema, on farther examination, has proved to be an unequivocal graptolitic genus, consisting of radiating filaments or branches which are connected together by transverse bars, and form flabellate or funnelshaped fronds growing from a radix, and

* The first volume of the Palæontology of New-York was published in less than four years from the time the work was placed in my charge, and this without an assistant of any kind furnished by the State; and the entire collections, except a small number previously in the State collection, were made at my private expense. This state of things, and the comparatively imperfect knowledge of the rocks at that time possessed by every one, may offer some excuse for many omissions and some imperfections.

having the inner side of the branches serrated*. The DICTYONEMA is known in the Niagara group, the Upper Helderberg limestones, and in the Hamilton group; while the Genus PLUMALINA, which may be regarded as an allied form, is known in the Chemung group.

The Graptolitideæ are therefore at this time clearly traced to the base of the Carboniferous system, and we may probably find allied genera to the close of the Palæozoic period.

Various opinions had been entertained, not only as to the nature of the Graptolites, but likewise as to their mode of growth; and it was not until 1854 that the researches in the Geological Survey of Canada brought to light some remarkable and unique forms, which for the first time gave us a true idea regarding their perfect form and manner of growth.

Through the kindness of Sir WILLIAM E. LOGAN, these specimens were placed in the hands of the writer, and some observations upon them were communicated to him in April 1855 : that notice was soon after read before the Geological Society of France, and otherwise made public in Europe.

The following extract from the Report of Progress of the Geological Survey of Canada for 1857 will serve to give a more perfect idea of this discovery, and of the character of the fossils.

CANADIAN GRAPTOLITES.

REPORT OF JAMES HALL, ESQUIRE, ADDRESSED TO SIR WILLIAM E. LOGAN, F.R.S., DIRECTOR OF THE GEOLOGICAL SURVEY OF CANADA.

ALBANY, MARCH 1, 1858.

SIR — In reply to your inquiry regarding the Graptolites and other allied genera, confided to me for description on behalf of the Geological Survey of Canada, partly in 1854 and partly at a subsequent time, I have the honor to inform you that six plates of the Graptolites have been engraved, and are now only waiting to be lettered, and that drawings for ten plates more are in the engraver's hands.

The description of twenty-four species accompanies the present communication, and the plates will follow as fast as they are completed.

In April 1855, I communicated to you a note upon these remarkable graptolites, discovered in the progress of the Geological Survey during the previous year. This discovery gave for the first time a

---

* Mr. SALTER was the first to announce publicly the serrate character of these branches, and, not recognizing his fossil as identical with DICTYONEMA, proposed the name GRAPTOPORA in 1857.

knowledge of the true forms and mode of growth of these fossils, of which fragments and detached branches have for so many years been described as complete forms. Neither up to that time, nor so far as I am aware to the present, has any evidence of the existence of perfect forms such as these been given to the public.

Two of the species were described in the note transmitted to you in 1855, and I have preceded the description of the remainder by a repetition of that note.

I have the honor to be, Sir, your most obedient servant,

JAMES HALL.

NOTE *upon the* Genus GRAPTOLITHUS, *and Descriptions of some remarkable new forms from the shales of the Hudson-river group, discovered in the investigations of the Geological Survey of Canada, under the direction of* Sir W. E. LOGAN. *By* JAMES HALL.

[Communicated in April, 1855.]

THE discovery of some remarkable forms of the Genus GRAPTOLITHUS, during the progress of the Canada Geological Survey, has given an opportunity of extending our knowledge of these interesting fossil remains. Hitherto our observations on the Graptolites have been directed to simple linear stipes, or to ramose forms, which, except in branching, or rarely in having foliate forms, differ little from the linear stipes. In a few species, as *G. tenuis* (HALL) and one or two other American species, there is an indication of more complicated structure; but, up to the present time, this has remained of doubtful significance. The question whether these animals, in their living state, were free or attached, is one which has been discussed without result; and it would seem to be only in very recent times that naturalists have abandoned altogether the opinion that these bodies belong to the *Cephalopoda*.

In the year 1847, I published a short paper on the Graptolites from the rocks of the Hudson-river group in New-York : to the number there given, two species have since been added from the shales of the Clinton group. Other species, yet unpublished, have been obtained from the Hudson-river group; and since the period of my publication in 1847, large accessions have been made to our knowledge of this family of fossils, and to the number of species then known. The most important publications upon this subject are *Les Graptolites de Bohême*, par J. BARRANDE, 1850; *Synopsis of the Classification of British Rocks, and Description of Palæozoic Fossils*, by Rev. A. SEDGWICK and FREDERICK M'COY, 1851; *Grauwacken Formation in Sachsen, etc.*, von H. B. GEINITZ, 1852.

The radix-like appendages, known in some of our American as well as in some European species, have been regarded as evidence that the animal in its living state was fixed; while M. J. Barrande, admitting the force of these facts, asserts his belief that other species were free. It does not, however, appear probable that in a family of fossils so closely allied as are all the proper *Graptolitideæ*, any such great diversity in mode of growth would exist.

It will appear evident from what follows, that heretofore we have been compelled to content ourselves, for the most part, with describing fragments of a fossil body, without knowing the original form or condition of the animal when living. Under such circumstances, it is not surprising that various opinions have been entertained, depending in a great measure upon the state of preservation of the fossils examined. The diminution in the dimensions, or perhaps we should rather say in the development, of the cellules or serrations of the axis towards the base, has given rise to the opinion advanced by Barrande, that the extension of the axis by growth was in that direction, and that these smaller cells were really in a state of increase and development. In opposition to this argument, we could before have advanced the evidence furnished by *G. bicornis*, *G. ramosus*, *G. sextans*, *G. furcatus*, *G. tenuis*, and others, which show that the stipes could not have increased in that direction. It is true that none of the species figured by Barrande indicate insuperable objections to this view; though in the figures of *G. serra* (Brongniart), as given by Geinitz, the improbability of such a mode of growth is clearly shown.

It is not a little remarkable that with such additions to the number of species as have been made by Barrande, M'Coy and Geinitz, so few ramose forms have been discovered; and none, so far as the writer is aware, approaching in the perfection of this character to the American species.

Maintaining as we do the above view of the subject, which is borne out by well-preserved specimens of several species, we cannot admit the proposed separation of the Graptolites into the genera *Monograpsus*, *Diplograpsus* and *Cladograpsus*, for the reason that one and the same species, as shown in single individuals, may be *monoprionidean* or *diprionidean*, or both; and we shall see still farther objections to this division, as we progress, in the utter impossibility of distinguishing these characteristics under certain circumstances. We do not yet perceive sufficient reason to separate the branching forms from those supposed to be not branched; for it is not always possible to decide which have or have not been ramose, among the

fragments found. Moreover there are such various modes of branching, that such forms as *G. ramosus* present but little analogy with such as *G. gracilis*.

M. Geinitz introduces among the *Graptolitideæ* the genus *Nereograpsus*, to include *Nereites*, *Myrianites*, *Nemertites* and *Nemapodia*. Admitting the first three of these to be organic remains, which the writer has elsewhere expressed his reasons for doubting, they are not related in structure, substance, or mode of occurrence, to the Graptolites, at least so far as regards American species; and the *Nemapodia* is not a fossil body, nor the imprint of one, but simply the *recent track of a slug* over the surface of the slates. The genus *Rastrites* of Barrande has not yet been recognized among American *Graptolitideæ*. These forms are by Geinitz united to his genus *Cladograpsus*, the propriety of which we are unable to decide.

The genus *Gladiolites* (*Retiolites* of Barrande, 1850; *Graptophyllia* of Hall, 1849) occurs among American forms of the *Graptolitideæ* in a single species in the Clinton group of New-York. A form analogous, with the reticulated margins and straight midrib, has been obtained from the shales of the Hudson-river group in Canada; suggesting an inquiry as to whether the separation of this genus, on account of the reticulated structure alone, can be sustained. In the mean time we may add that the Canada collection sustains the opinion already expressed, that the *Dictyonema* will form a genus of the family *Graptolitideæ*. The same collection has brought to light other specimens of a character so unlike anything heretofore described, that another very distinct genus will thereby be added to this family. The Canadian specimens show that the Graptolites are far from always being simple or merely branching flattened stems.

The following diagnosis will express more accurately the character of the Genus Graptolithus, as ascertained from an examination of perfect specimens in this collection.

Genus Graptolithus (Linnæus).

Corallum or bryozoum fixed (free?), simple or compound; the parts bilaterally arranged, consisting of simple stipes or of few or many simple or variously bifurcating branches, radiating more or less regularly from a centre, and, in the compound forms, united towards their base in a continuous thin corneous membrane or disk formed by an expansion of the substance of the branches, and which in the living state may have been in some degree gelatinous. Branches with a single or double series of cellules or serratures, communicating with a common longitudinal

canal, affixed by a slender radix or pedicle from the centre of the exterior side.

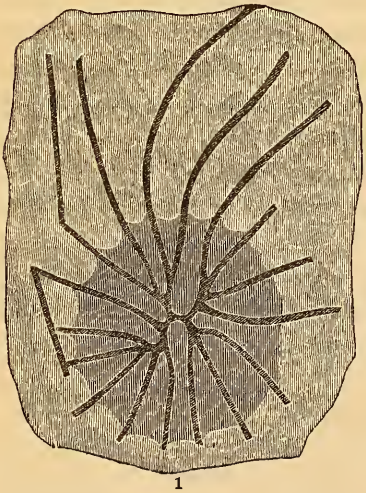
The fragments, either simple or variously branched, hitherto described as species of *Graptolithus*, are for the most part to be regarded as detached portions from the entire frond.

In the living state, we may suppose those with the corneous disks and numerously branched fronds to have been concavo-convex (the upper being the concave side), or to have had the power to assume this form at will. In many specimens there is no evidence of a radix or point of attachment, and they have very much the appearance of bodies which may have floated free in the ocean.

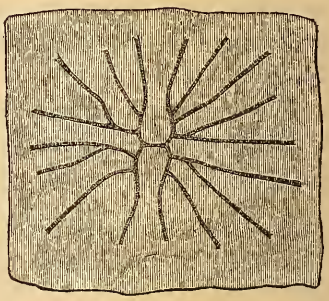
The accompanying figure 1 is the central portion of one of these graptolites, showing the bilateral arrangement of these branches and the bifurcation of the same. The disc enclosing the bases of the branches is well preserved, while most of the rays are broken off a little beyond its margin. The side presented is the lower or exterior of the specimen, and the serratures are not visible.

Fig. 2 is a specimen of the same species, from which the substance of the disc is removed, showing the serrated margin which is compressed in that direction.

Illustrations of Graptolithus logani.



1



2

3

Fig. 3 shows the central portion or radix, with the bases of the branches; while two of these are shown in their extension, laterally compressed and showing the serratures. The entire length of some of these branches is about seven inches.

Graptolithus logani.

Frond composed of numerous branches nearly equally disposed on two sides of a central connecting stipe, and each again subdividing nearly equally; after which they bifurcate, always near the base, with greater or less regularity: connecting membrane thin, composed of the same substance and continuous with the branches, extending from the centre to some distance beyond the bifurcations. The branches, after the third bifurcation, become marked on the inner side by a row of cellules, and along the centre by an abruptly impressed line which follows the divarication of the branches: cellules minute, not prominent towards the base of the branches, being compressed vertically, and appearing like a double series with a central depressed line, becoming developed as they recede from the base. The branches beyond the disk are turned on one side and laterally flattened, and present a single series of cellules or serrations, which are moderately deep, with the serratures acute at their extremities; from twenty-four to twenty-eight in an inch. The substance of the branches, upon the exterior surface near the centre, is marked by a depressed longitudinal line, which follows the ramifications, and gradually dies out as the branches become finally simple, when the surface on the same side is smooth or somewhat obliquely striated. The disk is smooth exteriorly; and from the centre is a small radicle, from which the two sets of branches diverge.

This species, though in a general manner bilateral and presenting four principal branches, is, nevertheless, from the irregular division of these, usually unequal upon the two sides; and we find on examination of those figured that they are as ten and ten, nine and eleven, eight and nine, ten and eleven, seven and ten, twelve and twelve, eight and eight, eight and ten, while the half which is figured (plate ii) has eleven rays.

Locality and formation. These specimens were obtained at Point Lévy, opposite to Quebec, in a band of bituminous shale separating beds of grey limestone. These strata belong to the Lower Silurian series, and are of that part of the Hudson-river group which is sometimes designated as Eaton's sparry limestone, being near the summit of the group: they form also the rocks of Quebec.

Graptolithus abnormis.

This species, of which only imperfect specimens have been seen, presents four principal branches diverging from the centre, two from each extremity of the vinculum, and each one of these bifurcating and branching unequally and at unequal distances from the centre.

The forms above described do not by any means exhaust the variety presented in this collection. With a single exception, however, all the specimens which offer any new light in regard to the habit of the Graptolites indicate that the mode of growth was in the manner described, in branches radiating from a centre, or in tufts joining in a central connecting substance.

The specimens from the Canadian locality afford further evidence in confirmation of what we have elsewhere observed, that, with few exceptions, the species have a limited geographical range. This locality has already, after very cursory examination, afforded eight new species of Graptolites, with one or two species which appear to be identical with those previously found in the State of New-York. A comparison of specimens from more southern localities, with those of New-York, shows a large proportion of new species; and it now appears probable that the number of American species of *Graptolithus* previously known (about twenty), will soon be increased by an equal number of new ones.

Locality and formation. Point Lévy : Hudson-river group.

In addition to the species above noticed, the following are published in the same Report for 1857 :

Graptolithus	*flexilis*,	*Graptolithus*	*indentus*,
G.	*rigidus*,	*G.*	*nitidus*,
G.	*octobrachiatus*,	*G.*	*bifidus*,
G.	*octonarius*,	*G.*	*patulus*,
G.	*quadribrachiatus*,	*G.*	*extensus*,
G.	*crucifer*,	*G.*	*denticulatus*,
G.	*bryonoides*,	*G.*	*pristiniformis*,
G.	*headi*,	*G.*	*ensiformis*, and
G.	*alatus*,	*G.*	*tentaculatus*.
G.	*fruticosus*,		

Besides these species of Graptolithus, there are some other forms separated by the writer under the name Phyllograptus, as follows :

Genus Phyllograptus.

Frond consisting of simple foliate expansions, celluliferous or serrated upon the two opposite sides : margins with a mucronate extension from each cellule ; or of similar foliate forms united rectangularly by their longitudinal axes, and furnished on their outer margins with similar cellules or serratures, the whole supported on a slender radicle.

These bodies, which usually appear upon the stone in the form of simple leaf-like expansions, may possibly have been attached in groups to some other support; but the form of some of them, and the character of the projecting radicle at the base, indicates that we have the entire frond. These forms furnish perhaps the best illustration of all the *Graptolitideæ*, of the lesser development of the cells at the base, and their gradual expansion above until they reach the middle or upper part of the frond. Many of them diminish from the centre upwards; and rarely the cells are more developed above the centre, reversing the usual form, and leaving the narrower part at the base.

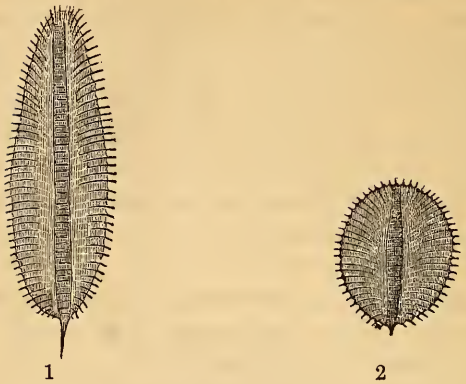
The species of this genus approach in general form to *G. ovatus* of Barrande and *G. folium* of Hisinger. They present, however, some differences of character; varying from broad-oval with the extremities nearly equal, to elongate-oval or ovate, the apex usually the narrower, but in a few instances the base is narrower than the apex. These forms are sometimes extremely numerous in the shales, and present on a cursory examination a general similarity to the leaves of large species of *Neuropteris* in the shales of the Coal measures.

Instead of the narrow filiform midrib represented in the figures and descriptions of the authors mentioned, these specimens present a broad linear midrib continued from the apex to the base, and extended beyond the base in a slender filiform radicle, usually of no great extent, but in some instances nearly half an inch in length. The midrib is rarely smooth, varying in width, with its margins not often strictly defined. In examining a great number of individuals of one species, I have discovered that this midrib is serrated; and though for the most part the serratures are obscure, they nevertheless present all the characteristics which they exhibit in graptolites of other forms, in which the branches have been compressed vertically to the direction of the serratures.

In this view, the lateral leaflike portions appear to be appendages to the central serrated portion; but these are nevertheless denticulate on their margins, and the intermediate spaces are well defined, as if admitting of no communication by serratures or cellular openings with the centre.

In another species the central axis or midrib is strong and broad, often prominent and distinctly serrate; the edges of the interspaces being all broken off, as if the extremities had been left in the slate cleaved from the surface: at the same time, the lateral portions are so well preserved as to show distinct cellules upon each side. We have therefore three ranges of cells visible, the central axis projecting at right angles to the two lateral parts. This remarkable feature leads to the inference that this graptolite was composed of four semielliptical parts joined at their straight sides, and projecting rectangularly to each other; presenting on each of the four margins a series of serratures, which, penetrating towards the centre, were all united in a common canal, and all sustained upon a simple radicle.

PHYLLOGRAPTUS TYPUS in two extreme forms.



1 2

Under this genus are described :

Phyllograptus typus, *P. ilicifolius*, *P. angustifolius*, and *P. similis*.

While these discoveries have been made in Canada, giving us for the first time a correct knowledge of the mode of growth and the varying forms of these bodies, I have not neglected opportunities of increasing our knowledge of these fossils from localities within my reach. The locality of graptolites near Albany has heretofore furnished several species, which, now that we know better their original forms, offer additional information, and become of greater interest both in their zoological and geological relations.

At this locality, some specimens have been obtained which show apparently the mode of reproduction in this family of animals, which is more similar to the hydroid polyps than to the Bryozoa*.

The specimens in which this feature has been observed, first show a slight swelling or vesicle proceeding from the axils of the serratures : this vesicle, which in the beginning is barely perceptible beyond the outlines of the margin, swells and becomes elongated, the extremity finally much inflated, and the base of the footstalk extended and attenuate. As this process of development goes on, the sac or inflated portion curves downwards, and finally becomes ruptured or dehiscent on the lower side near the extremity. At this period, and sometimes previously, the sac, which appears to be an extremely thin membrane and almost without substance, shows one or two elongated fibres, like the central midrib or the marginal longitudinal fibre of the graptolites. At a more advanced stage the

* This notice was read at the meeting of the American Association for the Advancement of Science at Baltimore in 1858, accompanied also by references to the Canadian graptolites.

substance of the sac gradually disappears, apparently by decomposition, leaving the slender fibre still attached for some time to the axil of the serrature.

These buds or vesicles do not appear at every serrature, but only on every third or fourth, and are apparently opposite each other on the two sides of the rachis, but in reality alternating as do the serratures. Associated with these specimens, and apparently resulting from these vesicles, are numerous young graptolites. But although these young or embryonic forms of graptolites occur in such great numbers, it cannot yet be said that any specimens have been seen within the sac, or attached to the parent stipe*.

The following figures will render more clear the preceding observations, and illustrate in some degree the forms described.

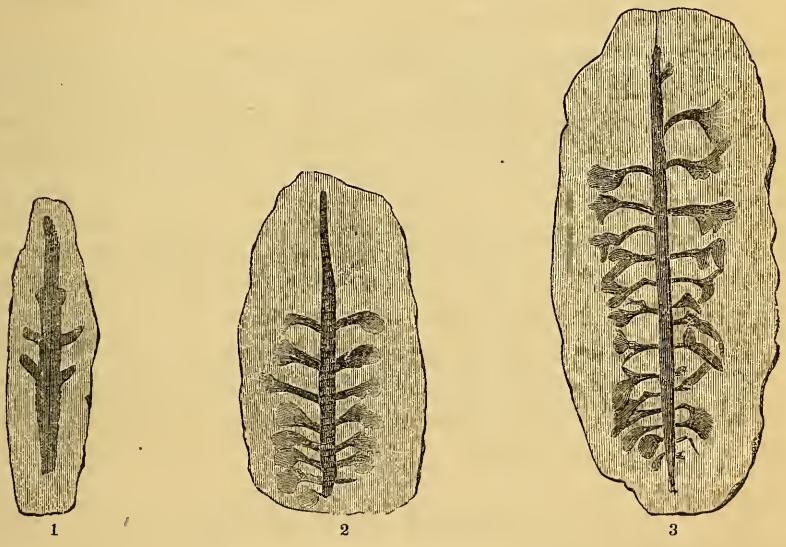


Fig. 1. A fragment of the stipe, showing the earlier development of these buds or vesicles.

Fig. 2. A fragment where these buds are farther developed, and the upper ones less expanded than those below.

Fig. 3. A longer stipe preserving numerous expanded vesicles in a farther developed condition; the most of them being broken, and some of them partially decomposed or absorbed, while they preserve very distinctly the delicate hair-like fibre before mentioned.

---

* The first discovery of a specimen of this character is due to Mr. Whitfield, some three years since; and subsequently I have been indebted to Mr. J. B. Ellis, and to Mr. G. W. Taylor, for other specimens of the same, as well as for other forms; while I owe to Mr. Henry Canfield the possession of the very fine specimen of *G. gracilis* figured on page 58. The discovery of the young graptolites has been of later date, and they have recently been observed in large numbers.

Fig. 4 *a*, *b*. A germ or young graptolite, showing the rootlets below and a short axial fibre extending above. This is a broad form, apparently of the doubly serrated kind, or *diplograpsus*, and appears to be developed to the first serratures. The figures are respectively of the natural size and enlarged.

Fig. 5. A minute specimen of a less symmetrical and apparently less fully developed form.

Fig. 6. Another individual which is farther developed than either of the preceding: the line marks the natural size.

There are several other varieties of form, which, inferring from the central midrib, are of those serrated on the two sides of the stipe, as are all those yet discovered with the vesicles attached.

Fig. 7 is apparently the young of one of the singly serrated forms, from the radical fibre extending along one side and beyond the body, while minute fibres (or rootlets?) extend downwards.

All these young forms preserve the axial fibre extended beyond the substance of the stipe, and there are usually two or three slender fibres extended below in the direction of the radix.

The condition of these bodies, and their association with those bearing the sacs, is so constant, that I have inferred their connexion, and that these are in fact the embryonic sacs.

The collection of specimens is quite numerous; but I am still making additions, with the hope that, at no distant period, we may know something more satisfactory relative to this newly observed and peculiar development.

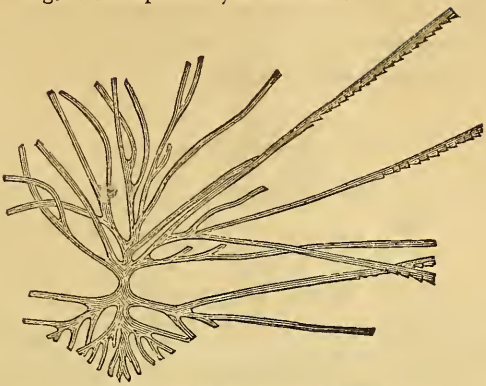
The following new species of Graptolites appear to be worthy of notice in this place.

Graptolithus multifasciatus.

Body consisting of numerous bifurcating branches, which are arranged bilaterally on either side of a short strong central bar. The branches bifurcate irregularly, and the subdivisions on one side amount to twenty-one, and on the other to twenty-two, while the specimen is far from being entire. The branches are serrated on one side: serratures somewhat closely arranged.

The specimen shows the lower or non-serrated surface, and several of the longer branches are turned sufficiently on one side to show the serrations in a tolerable degree of perfection.

Fig. 8. The specimen, natural size.



Graptolithus multifasciatus.

Graptolithus divergens (n. s.).

Body slender, consisting of a straight central stipe or rachis; on each side of the longitudinal centre of which are given off diverging branches in pairs, and nearly opposite each other at the bases: these branches are of unequal length, the longest being frequently as long as the main stipe on either side of its centre. Branches slenderly serrate on one side.

Fig. 9 is an individual of this species, one branch of which appears to bifurcate near its origin.

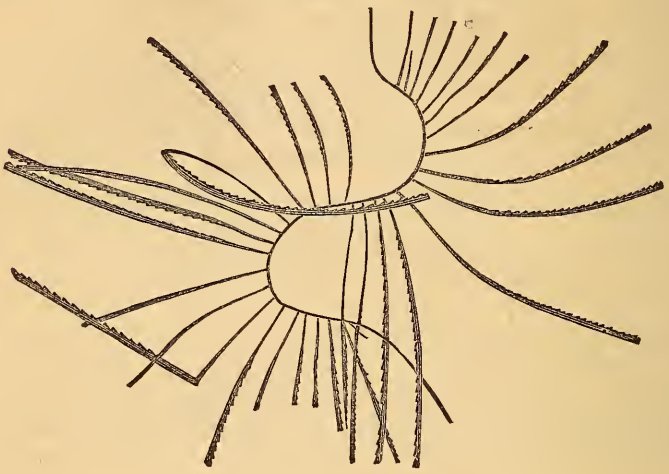
These species are from the shales of the upper part of the Hudson-river group.

Graptolithus gracilis.

The accompanying figure is of a very beautiful specimen of the *G. gracilis*, first described in the Palæontology of New-York, Vol. i, p. 274. The specimens of this species all present the peculiarity of having a slender sinuous rachis, approaching in form the letter S, from which the branchlets diverge always on the convex side of the curve, so that ordinarily one half the branchlets proceed in one direction and the other half in the opposite direction; and although there has been observed no mark of a radicle or central point, it seems probable that the place from which

the branches turn in opposite directions is the centre or point of origin of the animal body. It should moreover be observed that the serratures on the two sets of branches are usually turned in opposite directions, or towards the two extremities of the rachis.

Fig. 10. Graptolithus gracilis.



This one and the preceding species are remarkably slender, and, though serrated on one side only, present some marked peculiarities when compared with the singly serrated forms with central discs, and a bilateral arrangement of the branches, as in *G. logani*, *G. flexilis* and *G. multifasciatus*.

Among the undescribed fossils from the shales of the Hudson-river group, I have lately noticed a species of Rastrites, a graptolitic genus proposed by Barrande, and which, so far as I am aware, has not before been observed in this country. The similarity of the latter form with the last noticed species of Graptolithus (*G. gracilis*), suggests a probable relationship which may unite the two, or authorise the separation of *G. gracilis*, *G. divergens*, and some others, as a generic type distinct from those with central discs and uniserrate stipes.

TRILOBITES

OF THE

SHALES OF THE HUDSON-RIVER GROUP.

The Trilobites most common in the shales of the Hudson-river group are *Triarthrus beckii* and *Calymene senaria* = *C. blumenbachii?* I have likewise described two species of *Olenus* in the first volume of the Palæontology of New-York ; but these are rare in most localities of the rocks of this period.

Some years since, during the progress of the Geological Survey of Vermont by Rev. Z. Thompson, some specimens of Trilobites were obtained from the shales of this age in the town of Georgia; and these were subsequently placed in my hands. The Survey having since passed under the direction of Professor Hitchcock, I postponed the publication of the descriptions, fearing it might not be agreeable to him; but having now not only his approval, but his express desire that I would publish them, I give below the following species, preliminary to a more complete description and illustration.

Olenus thompsoni (n. s.).

General form ovate, the length and breadth being nearly as six to five. Head broad lunate, with the postero-lateral angles much extended ; the width from the centre to the outer margin of the eye almost equal to the width of the cheek. Eyes (which are much crushed in the specimen) elongate semioval, equal in length to the space between the anterior angles and the frontal margin : glabella distinctly lobed, narrower in front. Thorax with the lateral lobes about once and a half as wide as the middle lobe, consisting of fourteen articulations, the third one of which is much longer than the others, and curving downwards with an extension reaching as far as the line of articulation of the seventh rib. The posterior articulations are bent abruptly backwards, so that the free extremities are parallel with the axis. Pygidium small, pointed, without visible rings, and having a narrow ridge running down the centre.

The description is chiefly drawn from an impression in slate, and a cast made from the same, together with some fragments of the same species.

Geological position. In the shales in the upper part of the Hudson-river group.

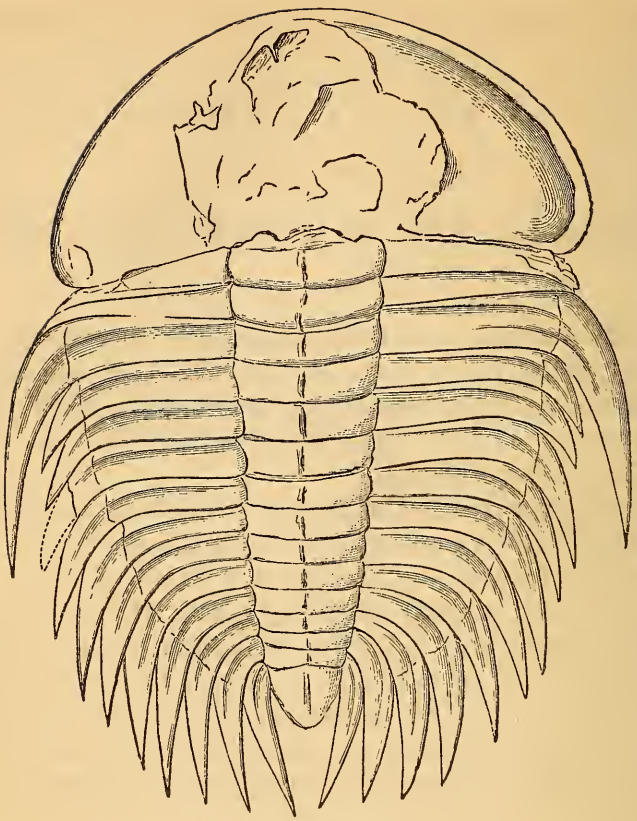


Fig. 1. OLENUS THOMPSONI.

OLENUS VERMONTANA (n. s.).

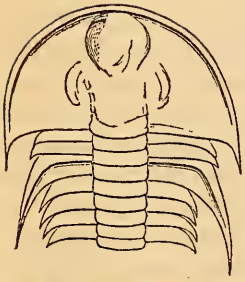


Fig. 2. OLENUS VERMONTANA.

GENERAL form elongate : the posterior extremity obtuse. Head semioval, twice as wide as long, the posterior angles produced in short acute spines. Eyes narrow elongate ; the space from the centre of the head to the outer margin of the eye much greater than the cheek, and the distance from the anterior angle of the eye to the frontal margin less than the length of the eye. Glabella lobed : hypostoma broad oval.

THORAX imperfect, preserving six articulations and part of the seventh ; the middle lobe wider than the lateral ones. The third articulation is much broader towards and at its lateral margin, and is prolonged obliquely downwards in a sharp spine, which reaches below the seventh articulation : the lateral extremities of the other articulations produced in short acute spines.

Another fragment, which is apparently of the same species, preserves eleven articulations of the thorax and the pygidium. The upper articulations are imperfect at their extremities; the last one is bent abruptly downwards, and terminates in a long spine on each side reaching below the pygidium. Pygidium semioval; the axis marked by four annulations, the two upper of which are faintly indicated in the lateral lobes.

This species differs from the preceding in its proportionally narrower form, the relative proportions of the parts of the head, and the short acute posterior spines. The comparative width of the middle and lateral lobes of the thorax is a very distinguishing feature.

Geological position. In the shales of the upper part of the Hudson-river group.

Peltura (Olenus) holopyga (n. s.).

Entire form elongate subelliptical, having a length of about twice and a half the width. Head somewhat semielliptical; the posterior angles produced in long spines. Glabella strongly lobed, its length a little greater than its greatest breadth; the entire breadth of the head, when entire, being about twice as great as the length. Hypostoma wider than long.

Thorax with eleven articulations; the middle lobe prominent, and about twice as wide as the lateral lobes; the articulations strong, rounded above, and each one marked in the centre by a node (or the base of a spine which has been broken off in the specimens examined). Articulations of the lateral lobes short (the extremities of the upper ones broken off in the specimen); the lower ones bending abruptly downwards, and terminating in spiniform processes, the last pair being prolonged much beyond the extremity of the pygidium.

Pygidium longitudinally semielliptical; the middle lobe marked by three annulations, and a fourth obscure one above the terminal lobe: lateral lobes flat and plain, the exterior margin apparently free from ornament or inequality.

The specimen from which the description and figure have been made is imperfect, in the absence of the cheeks with the posterior spines and frontal limb. These parts, with the hypostoma attached, lie upon the stone a little in advance and turned to one side of the head of the specimen, and have been drawn in their proper relations, but not attached to the head. That this portion of a trilobite belongs to the one figured, can scarcely admit of doubt; but in the absence of an entire head, which would warrant the restoration, I have given the figure as it occurs on the stone, with merely a change of the relation of the two parts. It is not proved, from this specimen, that the third articulation from the head may not have extended beyond the others, as shown in the two preceding species.

This species appears to belong to the Genus Peltura, taking the figures of *Olenus* (*Peltura*) *scarabæoides* as the type of the genus*. Our specimen

* This species, the *Entomostracites scarabæoides* of Wahlenberg, 1821 (*scarabæorum vel aliorum vaginipennium animale vestigia*: Bromel in Act. Litt. Upsal. 1729),

differs from that one in the absence of the obscure crenulations or inequalities upon the limb of the pygidium, which is regarded by Pictet as important. The number of segments of the thorax, if a constant character, seems much more important, and furnishes a more marked feature for the separation from Olenus.

Geological position. In the shales of the Hudson-river group.

Note. In addition to the evidence heretofore possessed regarding the position of the shales containing the Trilobites, I have the testimony of Sir W. E. Logan that the shales of this locality are in the upper part of the Hudson-river group, or forming a part of a series of strata which he is inclined to rank as a distinct group above the Hudson-river proper. It would be quite superfluous for me to add one word in support of the opinion of the most able stratigraphical geologist of the American continent.

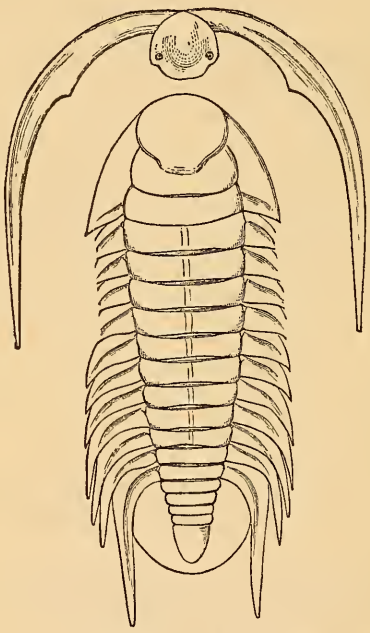


Fig. 3. Peltura holopyga.

---

has apparently been refigured from the same specimen, or from the same figure throughout, by subsequent authors; and the original appears to have been deprived of the cheeks, the frontal limb, and the posterior cephalic spines. The eye-tubercle, or the palpebral lobe, having collapsed as in our specimen, gives but a partial representation of the entire animal.

CATALOGUE

OF THE

SPECIES OF FOSSILS,

DESCRIBED IN VOLUMES I., II. AND III. OF THE PALÆONTOLOGY OF NEW-YORK;

With the Corrections in Nomenclature, as far as determined to the present time.

At the time of the publication of the first volume of the Palæontology of New-York, many of the species were referred to genera already described, in preference to proposing new genera, even where the identification was not entirely satisfactory: first, in deference mainly to European authors, from whom we had derived our knowledge of the palæozoic fossils of parallel or equivalent strata; and, secondly, because the materials available were not always in a condition to furnish satisfactory evidence, from the interior of the shell, of the relations of the fossils under examination. With few exceptions beyond the Brachiopoda, all the determinations of species were made from external characters; and I was even compelled, in a few instances, to describe new genera, with only a knowledge of the exterior of the shells. The collections at my disposal were very inadequate to the production of a satisfactory work; and it was only from the necessity arising from my position, that the volume was published before more complete investigations had been made.

At that time no general studies of the Brachiopoda had been made, or, if made, had not been published; and generic names had been adopted by authors without scrutinizing the relations of the fossils grouped under them. The terebratuloid forms had been proved not to be true Terebratulæ, and the generic name *Atrypa* of Dalman had been adopted, but without restriction; so that it finally came to include a heterogeneous assemblage of species similar to that before, and to some extent still, designated as *Terebratula*.

Although American authors favored the adoption of Rafinesque's genus *Strophomena*, European authors were not inclined to the same opinion; and Dalman's genus *Leptæna* was at that time regarded by several eminent European palæontologists as more clearly defined, and better applicable to a large number of forms, than the un-

certain and partially defined genus of Rafinesque. With such authority before me, I adopted the generic name *Leptæna*, and it has not been until a later period that the researches of Mr. Davidson have fully established, in Europe, the genus *Strophomena*.

The difficulties attending the proper distribution of the Brachiopoda were scarcely less at the time of the publication of the second volume; and I there intentionally avoided proposing new genera, waiting for the appearance of Mr. Davidson's work "On the Classification of the Brachiopoda." This important treatise, which, in its several editions in different languages, has thrown so much light upon the intimate structure, organization, and habits of this class of fossils, has given a new impulse to their study, and has rendered them of far greater geological value than ever heretofore.

Notwithstanding however the great extension of genera proposed by Mr. Davidson and by other English and Continental naturalists, the field appeared to me far from being fully explored; and after proposing several genera in addition to those already described, I have still material for others, though not yet satisfactorily determined.

In correcting the list of Brachiopoda, I have referred the species as far as possible to established genera, and have endeavored to indicate all cases of doubt by the simple ? or by some remark.

I had hoped to be able to devote more time to the preparation of this Catalogue; but to give it in all respects as I could wish, requires a re-examination of a large number of the species, and such a revision of the arrangement as would present the whole in a more connected form. This work I propose to complete as early as possible; offering in the mean time the following imperfectly corrected catalogue, which may be of use to the students in American Palæontology.

FOSSILS OF THE FIRST VOLUME.

Original Names.	Vol. I, page	Changed Names, Remarks, etc.
Acidaspis	240	
Acidaspis spiniger	241	
" trentonensis	241	
Actinocrinus tenuiradiatus	18	Palæocystites tenuiradiatus, Billings, Canadian Fossils, Decade iii, p. 69.
" (indet.)	18	Probably a plate of a cystidean.
Agnostus lobatus	258	
Alecto? inflata	77	
Ambonychia	163	
Ambonychia amygdalina	165	Palæarca? amygdalina. This species is not a true *Ambonychia*, belonging rather to *Palæarca*, or to *Megambonia*.
" bellastriata	263	
" carinata	294	
" obtusa	166	Palæarca obtusa.
" orbicularis	164	
" radiata	292	
" undata	165	The interior yet undetermined : perhaps referable to another genus.
" (indet.)	167	The specimen is not an *Ambonychia*, and remains undetermined.
Asaphus extans	228	
" latimarginata	258	
" marginalis	24	
" nodostriatus	248	
" obtusus	24	
Asterias matutina	91	Palæaster matutina.
" (indet.)	18	
Atrypa acutirostra	21	Rhynchonella acutirostra.
" altilis	23	Rhynchonella altilis.
" ambigua	143	Triplesia? ambigua.
" bisulcata	139	Genus?
" circulus	142	Perhaps the young of *Pentamerus hemiplicatus*.
" cuspidata	138	Triplesia cuspidata.
" deflecta	140	Genus?
" dentata	148	Rhynchonella dentata.

ORIGINAL NAMES.	Vol. I, page	CHANGED NAMES, REMARKS, etc.
Atrypa dubia	21	Rhynchonella dubia.
" exigua	141	Genus?
" extans	137	Triplesia extans.
" hemiplicata	144	Pentamerus hemiplicatus.
" increbescens	146 – 289	Rhynchonella increbescens.
" modesta	144	Genus? Related to *Leptocœlia?*
" nucleus	138	Triplesia nucleus.
" plena	21	Rhynchonella plena.
" plicifera	21	Rhynchonella plicifera.
" recurvirostra	140	Rhynchonella? recurvirostra. This species is perhaps generically identical with *A. modesta.*
" sordida	148	Rhynchonella sordida.
" subtrigonalis	145	Rhynchonella subtrigonalis.
Aulopora arachnoidea	76	
Avicula demissa	292	
" ? desquamata	292	The specimen has not been satisfactorily determined to the present time. It is not *Avicula.*
" elliptica	162	Genus?
" insueta	291	
" trentonensis	161	Genus?
Bellerophon bilobatus,	184 – 307	
" *var.* acutus	185	
" *var.* corrugatus	185	
" cancellatus	307	
BUCANIA	32	The genus *Bucania* is regarded by most authors as not distinct from *Bellerophon*; while these forms are made by D'ORBIGNY typical of the genus *Bellerophon*, and those like *B. bilobatus* are very erroneously placed by him under the genus *Cyrtolites*. Although there may be no sufficient reason for separating some forms of *Bellerophon* with exposed spires, I have for the present allowed these species to remain as originally described.
Bucania bidorsata	186	
" expansa	186	
" intexta	317	
" punctifrons	187	
" rotundata	33	
" sulcatina	32	
BUTHOTREPHIS	8	
Buthotrephis antiquata	8	
" flexuosa	263	
" gracilis	62	
" subnodosa	262	
" succulens	62	
Calymene beckii	237, 250	Triarthrus beckii.

Original Names.	Vol. I, page	Changed Names, Remarks, etc.
Calymene multicosta	228	The generic relations not fully determined
" senaria	238	
Cameroceras	221	
Cameroceras trentonense	221	
Capulus auriformis	31	This specimen is not a *Capulus;* and although admitted among the Chazy collections on the authority of the collector, it may be doubtful whether it does not come from a higher rock, and is more nearly related to *Platyostoma.*
Cardiomorpha vetusta	157	The generic relations are not satisfactorily determined.
Carinaropsis	183	Notwithstanding the objections made to the admission of this genus, I am not prepared to place the species under any other designation at the present time.
Carinaropsis carinatus	183	
" orbiculatus	306	
" patelliformis,	183, 306	
Ceraurus* pleurexanthemus,	242	
" pustulosus	241	Harpes pustulosus.
" vigilans	245	Cybele† vigilans.
Chætetes columnaris	68	Tetradium columnaris.
" lycoperdon	48	Stenopora?
" rugosus	67, 18	
Cleidophorus	300	

* I retain the name *Ceraurus* of Green (1832), though fully aware of the arguments of Barrande and others in favor of adopting *Cheirurus* of Beyrich (1845). In Green's monograph, a figure of this trilobite, though imperfect, was given; and a cast of the same was distributed widely both in Europe and America, and the genus became well known to palæontologists and amateurs among us. The view of M. Barrande that the genus was not clearly described, and therefore untenable before a later name, is an argument that could be applied with equal force to some of the genera proposed by European naturalists; for of the Trilobites, the genera *Homalonotus* and *Trinucleus* are, among others, examples of this kind, which names have nevertheless been adopted by American palæontologists without objection. The adoption of the generic name *Strophomena* is another case in point, for the original description is not remarkable for clearness.

It may perhaps be true that the limits of this genus of Green were not well understood in America; but the fact that I erroneously referred a species of another genus to *Ceraurus* is to be charged to me alone, and not to the obscurity of the description; for I had the original of Green and other well-marked specimens before me at the time, but referred the species to this genus in preference to proposing a new name, as it did not seem referable to any genus, the description of which was accessible to me.

In persisting in the use of this name, I believe I am sustained by common custom among naturalists in all countries; and I am convinced that the name *Ceraurus* will be restored, as have the names *Homalonotus*, *Trinucleus*, *Acidaspis*, and others, notwithstanding the later proposed and more clearly defined generic names of subsequent authors.

† I adopt the genus *Cybele* in deference to the opinion of Mr. Salter; not having myself examined the claim of priority of the authors of *Cybele* and *Encrinurus*, which are synonymous.

ORIGINAL NAMES. Vol. I, page	CHANGED NAMES, REMARKS, etc.
Cleidophorus planulatus ... 300	
Columnaria alveolata..... 47	
Conularia gracilis 224	
" granulata..... 223	
" papillata 223	
" trentonensis..... 222	
Cyrtoceras annulatum 194	
" arcuatum..... 196	
" camurum..... 196	
" constrictostriatum, 195	
" lamellosum 193	
" macrostomum ... 194	
" multicameratum . 195	
Cyrtolites compressus 188	
" filosum..... 189	
" ornatus..... 308	
" trentonensis..... 189	Shell slightly unsymmetrical, and perhaps referable to the genus *Ecculiomphalus*.
Cytherina (indet.) 44	Leperditia.
Delthyris biforatus, *var.* lynx, 133	Orthis biforatus, *var.* lynx.
DISCOPHYLLUM 277	This is probably a graptolitic genus, or a true graptolite; preserving the thin disc, as shown in the Canadian graptolites, while the apparent dissepiments are the rays or branches of the graptolite.
Discophyllum peltatum.... 277	
ECHINO-ENCRINITES 87	
Echino-encrinites ? anatiformis, 89	
Edmondia? subangulata.... 156	Palæarca subangulata.
" subtruncata 156	Palæarca subtruncata, fig. 3 *a b c*, p. 35. Palæarca —— ? Pl. 34, f. 9.
" ventricosa 155	Palæarca ventricosa.
ENDOCERAS 58	I leave the species under this genus as originally described for the present, though the subject requires revision. I am, however, by no means prepared to admit that the presence of the small orthoceras within the siphon of the larger one is accidental. Were it accidental, it seems most remarkable that some one of the numerous specimens should not have drifted into the cavity in the direction opposite that in which they always occur.
Endoceras angusticameratum, 218	
" annulatum..... 207	
" approximatum .. 219	
" arctiventrum 217	
" distans 220	
" duplicatum 219	
" gemilliparum ... 60	
" longissimum 59	
" magniventrum .. 218	
" " *var. a.*, 218	

Original Names.	Vol. I, page	Changed Names, Remarks, etc.
Endoceras multitubulatum,	59	
" proteiforme,	208, 213, 216, 311.	
" *var.* elongatum	216	
" *var.* lineolatum	211	
" *var.* strangulatum	212	
" *var.* tenuistriatum	209	
" *var.* tenuitextum	210	
" subcentrale	59	
Escharopora	72	
Escharopora recta	72	
" *var.* nodosa	73	
Euomphalus uniangulatus	9	
Favistella	275	
Favistella stellata	275	
Glyptocrinus	281	
Glyptocrinus decadactylus	381	
Gonioceras	54	
Gonioceras anceps	54	
Gordia marina	264	The trail formed by some animal (shell or worm), moving along the bottom. See remarks, page 264, vol. i, Palæontology of New-York; also Report of Dr. A. Fitch on the Geology of Washington county, published in the Report of the New-York State Agricultural Society, vol. ix, p. 866.
Gorgonia? aspera	16	Fenestella aspera.
" ? perantiqua	76	Retepora? perantiqua.
Graptolithus amplexicaule	79	
" bicornis	269	
" furcatus	273	
" gracilis	274	
" lævis	274	
" mucronatus	268	
" pristis	265	
" ramosus	270	
" sagittarius	272	
" scalaris	274	
" secalinus	267	
" serratulus	274	
" sextans	273	
" tenuis		
Heterocrinus	278	
Heterocrinus gracilis	280	
" heterodactylus	274	
" simplex	280	

Original Names. Vol. I, page	Changed Names, Remarks, etc.
Holopea ---------- 169	
Holopea obliqua ---------- 170	
" paludiniformis -- 170	
" symmetrica ----- 170	
" ventricosa ------ 171	
Illænus arcturus --------- 23	
" crassicauda ---- 24, 229	
" latidorsata --------- 230	
" trentonensis ------- 230	
" (Thaleops) ovatus --- 259	
Intricaria? reticulata ------ 77	The generic relations of the specimen not clearly determined.
Isotelus canalis ---------- 25	Asaphus canalis.
" gigas ---- 25, 231 – 254	Asaphus canalis.
Leptæna alternata --- 102 – 286	Strophomena alternata.
" alternistriata ---- 109	S. alternistriata.
" camerata ------- 106	S. camerata.
" deflecta -------- 113	S. deflecta.
" deltoidea ------- 106	S. deltoidea.
" fasciata --------- 20	S. fasciata.
" filitexta -------- 111	S. filitexta.
" incrassata ------ 19	S. incrassata.
" planoconvexa---- 114	S. planoconvexa.
" planumbona ---- 112	S. planumbona.
" plicifera -------- 19	S. plicifera.
" recta ----------- 113	S. recta.
" sericea ---- 110 – 287	Leptæna sericea.
" subtenta ---------- 115	Strophomena subtenta.
" tenuilineata ---- 115	S. tenuilineata.
" tenuistriata ----- 108	S. tenuistriata.
Lingula acuminata ------- 9	
" æqualis ---------- 95	
" antiqua ---------- 3	
" attenuata --------- 94	
" crassa ----------- 98	
" curta ------------ 97	
" elongata ---------- 97	
" obtusa ----------- 98	
" prima ------------ 3	
" quadrata ------ 96, 285	
" riciniformis ------- 95	
Lituites convolvans ------- 53	

Original Names.	Vol. I, page	Changed Names, Remarks, etc.
Lituites undata	52	
Lyrodesma	302	
Lyrodesma plana	302	
" pulchella	302	Tellinomya pulchella.
Maclurea magna	20	
" matutina	10	
" sordida	20	
Metoptoma ? dubia	23	Genus undetermined.
" ? rugosa	306	Genus undetermined.
Modiola ? obtusa	40	The shell is too obscure to be satisfactorily determined. It is probably a *Palæarca* or a *Modiolopsis*.
Modiolopsis	157	The species originally described under this genus are not all referable to one generic form, but I have not yet obtained the means of a satisfactory discrimination in all the examples.
Modiolopsis anodontoides	298	
" arcuatus	159	
" aviculoides	161	
" carinatus	160	
" ? curta	297	This species is probably distinct from *Modiolopsis*.
" faba	158, 298	
" latus	160	Palæarca lata.
" modiolaris	294	
" nasutus	159, 296	
" ? nuculiformis	298	This species is probably a *Nucula* or *Tellinomya*.
" parallela	158	
" subspatulatus	159	Palæarca subspatulata.
" ? trentonensis	161	
" truncatus	296	
Murchisonia abbreviata	32	
" ? angustata	41	
" bellacincta	179	
" bicincta	177	
" gracilis	181 – 303	
" perangulata	41	
" *var.* A	179	
" subspiniformis	180	
" bicarinata	178	
" uniangulata	179	
" *var.* abbreviata	304	
" varicosa	41	
" ventricosa	41	
" vittata	181	

ORIGINAL NAMES.	Vol. I, page	CHANGED NAMES, REMARKS, etc.
Natica?	42	This is probably a species of *Holopea*.
Nucula? donaciformis	316	Tellinomya donaciformis.
" levata	150	Tellinomya levata.
" ? postriata	151, 201	Genus undetermined.
Ogygia? vetusta	227	Asaphus vetustus.
Olenus asaphoides	256	
" undulostriatus	258	
ONCOCERAS	196	
Oncoceras constrictum	197	
OPHILETA	11	
Ophileta complanata	11	
" levata	11	
Orbicula cœlata	290	Trematis cœlata.
" ? crassa	290	Genus?
" ? deformata	23	Genus?
" ? filosa	99	Crania? filosa. The relations of this species are with *Crania*, if it be not a true *Crania*.
" lamellosa	99	Discina lamellosa.
" ? subtruncata	290	Probably related to *Crania*, from its analogy with other forms in the higher rocks.
" terminalis	100	Trematis terminalis.
Ormoceras gracile	58	
" tenuifilum	55, 222	This species is probably identical with *Ormoceras backi*.
" *var.* distans	58	
Orthis æquivalvis	120	
" bellarugosa	118	
" centrilineata	289	
" costalis	20	
" dichotoma	125	
" disparilis	119	
" ? erratica	228	
" fissicosta	121	
" insculpta	125	
" occidentalis	127	This species, with *O. sinuata* and *O. subjugata*, may form but a single species; though from the collections in my hands in 1847, I found what appeared to be satisfactory means of distinguishing them. Since examining the species of the Lower Helderberg limestone, I have found numerous forms which appear as closely allied as do these, but which are nevertheless clearly distinguished by their interior markings. I am not satisfied that the European species, *Orthis porcata*, is identical with ours.
" pectinella	123	
" *var.* semiovalis	124	
" perveta	120	

Original Names.	Vol. I, page	Changed Names, Remarks, etc.
Orthis plicatella	122	
" sinuata	128	
" subæquata	118	
" subjugata	129	
" subquadrata	126	
" testudinaria	117	
" tricenaria	121	
Orthoceras amplicameratum,	205	
" anellum	202	
" arcuoliratum	198	
" bilineatum	199	
" *var. a*	300	
" clathratum	201	
" fusiforme	60	Gomphoceras? fusiforme.
" junceum	204	
" laqueatum	13	
" latiannulatum	204	
" moniliforme	35	
" multicameratum	44	
" primigenium	13	
" rectiannulatum	34	
" recticameratum	45	
" strigatum	405	
" subarcuatum	34	
" tenuiseptum	35	
" teretiforme	198	
" textile	199	
" undulostriatum	202	
" vertebrale	201	
Orthonota contracta	300	
" parallela	299	
" pholadis	299	
Palæophycus	7	
Palæophycus irregularis	8	
" rugosus	63	
" simplex	63	
" tubularis	7	
" virgatus	263	
" (indet.)	28	
Phacops callicephalus	247	In the present distribution of the Trilobites, this species will fall under the genus *Dalmania* = *Dalmania callicephala.*

ORIGINAL NAMES.	Vol. I, page	CHANGED NAMES, REMARKS, etc.
Phacops? laticaudus	248	This name may be stricken from the list. The specimen, in dark limestone, was undoubtedly originally sent from Schoharie to Lewis county, and finally becoming mingled with the Trenton limestone fossils of the latter locality, was labelled as from the Trenton limestone. It is the pygidium of *Dalmania micrurus* or *D. pleuroptyx*. See Palæontology of New-York, Vol. iii, p. 356.
PHYTOPSIS	38	
Phytopsis tubulosum	38	
" cellulosum	39	
PLATYNOTUS	235	LICHAS.
Platynotus trentonensis	235	Lichas trentonensis.
Pleurotomaria ambigua	176	
" antiquata	31	
" biangulata	31	
" [?] bilix	305	Cyclonema bilix.
" indenta	176	
" lenticularis	172	
" ? nodulosa	44	
" ? nucleolata	42	
" ? obsoleta	44	
" percarinata	177	It is probable that this species may be identical with *P. bilix* of the original list.
" quadricarinata	43	
" rotuloides	173	
" subconica	174 – 304	
" subtilistriata	172	
" turgida	12	
" umbilicata	43 – 175	
" (indet.)	31	
Porites vetusta	71	Heliolites vetusta.
Poteriocrinus alternatus	83	——?
" gracilis	84	
RAPHISTOMA	28	The distinction between this genus and *Scalites* requires to be more clearly determined.
Raphistoma planistria	30	
" *var.* parva	30	
" staminea	29	
" striata	28	
Receptaculites neptunii	68	
Retepora? foliacea	78	This name may be erased from the list of fossils.
" gracilis	15	Fenestella gracilis.
" incepta	15	Fenestella incepta.
Scalites angulatus	27	

Original Names.	Vol. I, page	Changed Names, Remarks, etc.
Schizocrinus	81	
Schizocrinus nodosus	81	
" striatus	316	
" (indet.)	86	
Scyphocrinus	85	Not *Scyphocrinus* of Zenker.
Scyphocrinus heterocostalis	85	
Scolithus	2	
Scolithus linearis	2	
Sphenothallus	261	
Sphenothallus angustifolius	261	
" latifolius	262	
Stellipora	79	
Stellipora antheloidea	79	This species is referred by Edwards and Haime to the Genus *Constellaria* of Dana (Zoophytes, 1849). A more careful examination, and removal of the adhering shaly matter, shows the entire surface to be poriferous. I have not, however, found good reason for separating these forms of *Chætetes* (*Stenopora*) from others in the same association; and the *Chætetes lycoperdon*, in the hemispheric forms, has not unfrequently its surface, or a part of its surface, marked by stelliform elevations as in the specimen under consideration.
Stictopora*	73	
Stictopora acuta	74	
" elegantula	75	
" fenestrata	16	
" glomerata	17	
" labyrinthica	50	
" ramosa	51	
Streptelasma	17	MM. Milne-Edwards & Jules Haime have regarded the *S. corniculum*, *S. crassa*, *S. multilamellosa* and *S. parvula* as identical species. The *S. parvula* may be the young of *S. corniculum*; but *S. crassa* presents features incompatible with specific identity. The original of *S. multilamellosa* is not now accessible to me for comparison. The species identified as *S. corniculum* by these authors, from western localities, I have regarded as a distinct form.
Streptelasma corniculum	69	
" crassa	70	
" expansa	17	
" multilamellosa	70	
" parvula	71	
" profunda	49	
Stromatocerium	48	
Stromatocerium rugosum	48	

* I am not yet convinced that this genus is synonymous with *Ptilodictyia* of Lonsdale. The typical species of the latter genus, *P. lanceolata*, presents certain differences of character, which, judging from figures only, may be regarded as of generic importance. The characters of *P. lanceolata*, as shown in figures and in a closely allied species in our strata, correspond more nearly with those species which I have referred to the genus *Phænopora*, and which may be identical with *Ptilodictyia*. All the species of *Phænopora* which I have observed are simple, as is the typical form of *Ptilodictyia*, while the *Stictoporæ* are always ramose.

ORIGINAL NAMES.	Vol. I, page	CHANGED NAMES, REMARKS, etc.
SUBULITES	182	
Subulites elongata	182	
TELLINOMYA*	151	
Tellinomya anatiniformis	154	
" dubia	153	
" gibbosa	153	
" nasuta	152	
" sanguinolaroidea	152	
Tentaculites flexuosa	92 – 284	The pedicle of a cystidean, and the name may therefore be stricken from the list.
Thaleops (Illænus) ovatus	259	Illænus ovatus.
Theca triangularis	313	
Trinucleus concentricus,	249, 255	
Trocholites ammonius	192, 309	
" planorbiformis	310	
Turbo dilucula	12	These species require farther examination to determine their generic relations.
" obscura	12	
——? cyathiformis	72	This species, originally figured on Plate 25 of Vol. I, Palæontology of New-York, was too obscure in its intimate structure to be referred satisfactorily to any known genus. At a later period (1850), I determined it to be generically identical with a species occurring in the Leadbearing limestone of Wisconsin and Iowa, which was subsequently figured and described by Dr. D. D. OWEN under the name *Selenoides (S. iowensis)*; being referred by him to the Foraminifera, and related to the *Orbitulina* or *Orbitoides*. Should this genus prove distinct from *Receptaculites*, to which I had referred the western specimens, the species above will be recorded as *Selenoides cyathiformis*. Very recently Mr. SALTER has advanced the opinion that the *Receptaculites* belongs to the Foraminifera, and is related to the *Orbitolites*, without apparently having known of this suggestion of Dr. OWEN in regard to an allied or identical generic form.

* Mr. SALTER has more recently proposed the name *Ctenodonta* for the species included under this genus, on account of the inappropriateness or erroneous signification of the name *Tellinomya;* the hinge-line being crenulate, and the species not at all related to *Tellina* or *Mya*. The name was originally given from the external form; and so soon as I obtained the means to do so, I illustrated the hinge-structure. I retain the name *Tellinomya*, according to the usage of naturalists.

FOSSILS OF THE SECOND VOLUME.

Original Names.	Vol. II, page	Changed Names, Remarks, etc.
Acidaspis ———?	299	
Acroculia	288	Platyceras.
Acroculia angulata	289	Platyceras angulata.
" niagarensis	288	P. niagarensis.
Apiocystites	242	
Apiocystites elegans	243	
Arges phlyctanodes	314	Lichas phlyctanodes.
Arthrophycus	4	
Arthrophycus harlani	5	
" ———?	6	
Astrocerium	120	
Astrocerium constrictum	123	
" parasiticum	122	
" pyriforme	123	Favosites?
" venustum	120	
Atrypa aprinis	280	Rhynchospira? aprinis.
" bidens	69	Rhynchonella bidens.
" bidentata	276	Rhynchonella bidentata.
" brevirostris	278	Pentamerus brevirostris. Probably only a variety of *Pentamerus interplicatus.*
" camura	273	Trematospira camura.
" congesta	67	Triplesia? congesta.
" corallifera	281	Genus?
" crassirostra	269	Merista? crassirostra.
" cuneata	276	Rhynchonella cuneata.
" cylindrica	76	Merista cylindrica.
" ——(?)	78	
" disparilis	277	Leptocœlia disparilis.
" emacerata	71	Rhynchonella emacerata.
" equiradiata	70	Rhynchospira? equiradiata.
" ? gibbosa	79	
" hemispherica	74	Leptocœlia hemispherica.
" intermedia	77	Merista intermedia.
" interplicata	275	Pentamerus interplicatus.

Original Names. Vol. II, page	Changed Names, Remarks, etc.
Atrypa lamellata 329	Rhynchonella lamellata.
" naviformis 76	Merista? * naviformis.
" neglecta ..... 70 – 274	Rhynchonella neglecta.
" nitida 268	Merista nitida.
" nitida, *var.* oblata .. 269	M. nitida, *var.* oblata.
" nodostriata 272	
" nucleolata 328	Merista nucleolata.
" oblata 9	Merista oblata.
" obtusiplicata 279	Rhynchonella obtusiplicata.
" planoconvexa 75	Leptocœlia planoconvexa.
" plicata 10	Rhynchonella plicata.
" plicatella? 279	R. plicatella.
" plicatula 74	Allied to *Leptocœlia*.
" quadricostata 68	Triplesia? quadricosta.
" reticularis .... 72 – 270	
" robusta 71	Rhynchonella robusta.
" rugosa 271	
" ——— 78	
Avicula emacerata .... 83 – 282	
" limæformis 332	
" ? orbiculata 284	
" rhomboidea 84	
" securiformis 331	
" subplana 283	
" subrecta 331	
" undata 283	
Bellerophon auriculatus ... 334	
Beyrichia lata 301	
" symmetrica 317	
Bronteus niagarensis 314	
Bucania angustata 347	
" (?) bellapuncta 93	
" stigmosa 92	
" trilobata ..... 13 – 93	
" ——— 334	
Bumastis barriensis .. 299 – 302	Illænus barriensis.
Buthotrephis gracilis 18	

* This species, and some others of the Clinton and Niagara groups, differ somewhat from true *Meristæ*; and should these differences prove of generic importance, I propose for them the name *Meristella*.

Original Names.	Vol. II, page	Changed Names, Remarks, etc.
Buthotrephis gracilis (?)	20	
" " *var.* crassa	19	
" " *var.* intermedia,	19	
" impudica	20	
" palmata	20	
" ramosa	20	
Callocystites	238	
Callocystites jewettii	239	
" " *var.?*	239	
Callopora	144	
Callopora aspera	147	
" elegantula	144	
" florida	146	
" laminata	146	
" nummiformis	148	
Calymene blumenbachii, *var.* niagarensis,	307	
" " *var.* senaria	299	
" cameratum	337	
" clintoni	298	——— ?
Caninia bilateralis	41, 113	Zaphrentis bilateralis.
Cannapora	43	
Cannapora junciformis	43	
Caryocrinus	216	
Caryocrinus ornatus	182, 216	
Catenipora escharoides	44, 127	Halysites escharoides.
" agglomerata	129	H. agglomerata.
Cerampora	168	
Cerampora foliacea	170	
" imbricata	169	
" incrustans	169	
Ceraurus insignis	300 – 306	
Chætetes lycoperdon	40	
" " ?	7	
Chonetes	64	
Chonetes cornuta	64	
Cladopora	137	
Cladopora cæspitosa	138	
" cervicornis	139	
" fibrosa	139	
" macrophora	140	

Original Names.	Vol. II, page	Changed Names, Remarks, etc.
Cladopora multipora	140	
" reticulata	141	
" seriata	137	
Clathropora	150	
Clathropora alcicornis	150	
" frondosa	160	
Closterocrinus	179	
Closterocrinus elongatus	179	
Columnaria inequalis	223	
Conophyllum	114	
Conophyllum niagarense	114	
Conularia longa	295	
" niagarensis	294	
Cornulites flexuosus	98	
Cybele	297	
Cybele punctata	297	
Cyclolites rotuloides	42	
Cyclonema	89	
Cyclonema cancellata	90	
" "(?)	91	
" (?) obsoleta	90	
" sulcata	347	
" ventricosa	90	
Cyrtoceras? arcticameratum,	349	
" cancellatum	290	
Cytherina alta	338	Leperditia jonesi. See description, Pal. N.Y. vol. iii, p.372.
" cylindrica	14	Leperditia cylindrica.
" spinosa	317	Beyrichia? spinosa.
Delthyris, *see* Spirifer.		
Dendrocrinus	193	
Dendrocrinus longidactylus,	193	
Diamespora dichotoma	158	
Dictuolites beckii	6	
Dictyonema	174	
Dictyonema gracilis	175	
" retiformis	174	
Diplophyllum	115	Probably identical with the genus *Diphyphyllum*.
Diplophyllum cæspitosum	116	Diphyphyllum cæspitosum.
" ——— (?)	118	
" coralliferum	322	D. coralliferum.

Original Names.	Vol. II, page	Changed Names, Remarks, etc.
Discosorus*	99	
Discosorus conoideus	99	
Eucalyptocrinus	207	
Eucalyptocrinus cœlatus	210	
" decorus	207	
" papulosus	211	
Favistella favosidea	41	
Favosites favosa	126	
" niagarensis	125	
" ——— (?)	324	
Fenestella cribrosa	166	
" elegans	164	
" prisca (?)	50	
" tenuiceps	165	
" tenuis	51	
" ———	166	
Glyptaster	187	
Glyptaster brachiatus	187	
Glyptocrinus plumosus	180	
" ———	181	
Gomphoceras?	290	
Graptolites	39	
Graptolithus clintonensis	39	
" venosus	40	Retiolites venosus.
Heliolites	130	
Heliolites elegans	130	
" macrostylus	135	
" pyriformis	133	
" spinipora	131	
Helopora	44	
Helopora fragilis	44	
Hemicystites	245	Probably identical with the genus *Agelacrinus*.
Hemicystites parasitica	246	Agelacrinus parasitica.
Heterocystites	229	
Heterocystites armatus	229	

Homalonotus delphinocephalus, 104, 299 – 309.

---

* I am not prepared, at the present time, to accept the view advanced that this fossil is the siphuncle of an *Orthoceras*. On some future occasion, I hope to be able more fully to illustrate its characters.

ORIGINAL NAMES.	Vol. II, page	CHANGED NAMES, REMARKS, etc.
HOMOCRINUS	185	
Homocrinus cylindricus	187	
" parvus	185	
HORNERA	163	
Hornera (?) dichotoma	163	
ICHNOPHYCUS	26	
Ichnophycus tridactylus	26	
ICHTHYOCRINUS	195	
Ichthyocrinus clintonensis	181	
" lævis	195	
ICHTHYODORULITE	104	
INOCAULIS	176	
Inocaulis plumulosa	176	
LECANOCRINUS	199	
Lecanocrinus caliculus	203	
" macropetalus	199	
" ornatus	201	
" simplex	202	
Leptæna bipartita	326	Strophomena bipartita.
" corrugata	19	S. corrugata.
" depressa	62, 257	S. rugosa.
" obscura	62	S. obscura.
" obscura?	103	S. obscura?
" orthididea	62	S. orthididea.
" patenta	60	S. patenta.
" profunda	61	S. profunda.
" ——— (?)	61	S. ———?
" sericea	59	
" striata	259	Strophomena striata.
" subplana	259	S. subplana.
" transversalis	256	
" ——— (?)	326	S. ———?
LICHAS	311	
Lichas boltoni	311	
LICHENALIA	171	
Lichenalia concentrica	171	
LIMARIA	142	
Limaria fruticosa	143	
" laminata	143	
" ramulosa	142	
Lingula acutirostra	56	

Original Names.	Vol. II, page	Changed Names, Remarks, etc.
Lingula cuneata	8	
" lamellata	55, 249	
" oblata	54	
" oblonga	54	
" perovata	55	
Lyriocrinus	197	
Lyriocrinus dactylus	197	
Macrostylocrinus	203	
Macrostylocrinus ornatus	204	
Megalomus	243	
Megalomus canadensis	243	
Melocrinites	227	
Melocrinites sculptus	228	
Modiolopsis orthonotus	10	
" ovatus	101	
" ? primigenius	11	This species is probably a *Palæarca*.
" subalatus	84	
" ———?	285	
" subcarinatus	101	
" undulostriatus	284	
Murchisonia bivittata	345	
" boydii	346	
" (?) conoidea	13	
" loganii	346	
" longispira	345	
" macrospira	346	
" (?) obtusa	332	
" subulata	91	
" (?) terebralis	334	
" turritiformis	347	
Myalina mytiliformis	100	Genus?
Myelodactylus	191	
Myelodactylus brachiatus	222	
" convolutus	192	
" ——— (?)	232	
Onchus	320	
Onchus deweyii	320	This spine, referred to the genus *Onchus*, is the posterior spine of a crustacean of the gonus *Ceratiocaris*, or of an allied genus = *Ceratiocaris deweyi*.
Oncoceras expansum	337	
" gibbosum	14	
" subrectum	94	

ORIGINAL NAMES. Vol. II, page	CHANGED NAMES, REMARKS, etc.
Orbicula (?) squamiformis .. 250	Craniops squamiformis.
" tenuilamellata ... 250	Discina tenuilamellata.
Ormoceras vertebratum 94	
Orthis circulus 56	
" elegantula 252	
" " *var.* 57	
" fasciata 255	
" flabellum? *var.* 254, 255	
" hybrida 253	
" interstriata 326	
" pisum 250	
" punctostriata 254	
" pyramidalis 351	
" tenuidens 58	
" trinucleus 58	
Orthoceras abruptum 97	
" annulatum 96	
" cancellatum 292	
" clavatum 104	
" imbricatum 291	
" multiseptum 291	
" virgatum 291	
" virgulatum 96	
" ——— . 14, 291, 292	
Orthonota curta 86	
" " (?) 285	
PALÆASTER 247	
Palæaster niagarensis 247	
Palæophycus striatus 22	
" tortuosus 26	
" ——— ? 22	
Pentamerus fornicatus 81	
" oblongus 79	
" occidentalis 341	
" ovalis 103	
Phacops limulurus 299	Dalmania limulurus.
" trisulcatus 300	
PHÆNOPORA 46	
Phænopora constellata 47	
" ensiformis 48	
" explanata 46	

Original Names.	Vol. II, page	Changed Names, Remarks, etc.
Platyostoma niagarensis	287	
" ———	91, 286, 332	
Pleurotomaria bispiralis	348	
" litorea	12	
" perlata	349	
" (?) pervetusta	12	
" solarioides	348	
" subdepressa	332	
" (?) ———	348	
Polydilasma	112	Probably a *Zaphrentis*.
Polydilasma turbinatum	112	Zaphrentis? turbinatum.
Polypora	167	
Polypora incepta	167	
Posidonia? alta	87	
Posidonomya rhomboidea	284	
Proetus	315	
Proetus coryceus	315	
" (?) stokesii	316	
Pyrenomœus	87	
Pyrenomœus cuneatus	87	
Retepora angulata	49	
" asperatostriata	161	
" diffusa	160	
Rhinopora	48	
Rhinopora tuberculosa	170	
" tubulosa	49	
" verrucosa	48	
Rusophycus	23	
Rusophycus bilobatus	24	
" clavatus	23	
" pudicus	24	
" subangulatus	23	
Saccocrinus	205	
Saccocrinus speciosus	205	
Sagenella	172	
Sagenella membranacea	172	
Scolithus verticalis	6	
Spirifer bicostatus	263	
" biforatus, *var.* lynx	65	Orthis biforatus, *var.* lynx.
" bilobus	260	O. bilobus.
" crispus	262, 328	

ORIGINAL NAMES.	Vol. II, page	CHANGED NAMES, REMARKS, etc.
Spirifer niagarensis	264	
" pyramidalis	266	
" radiatus	66, 265	
" sulcatus	261	
" ———	66	Pentamerus?
STEPHANOCRINUS	212	
Stephanocrinus angulatus	212	
" gemmiformis	215	
Stictopora crassa	45	
" punctipora	157	
" raripora	46	
Streptelasma calicula	111	
STRIATOPORA	156	
Striatopora flexuosa	156	
STROMATOPORA	135	
Stromatopora concentrica,	136, 325	
" constellata	324	
STROPHODONTA	63	
Strophodonta prisca	63	
" textilis	327	
Subulites ventricosa	347	
SYRINGOPORA	118	
Syringopora? multicaulis	119	
Tellinomya curta	86	
" elliptica	102	
" (?) equilatera	330	
" lata	85	
" machæriformis	85	
Tentaculites minutus	183	
" distans	184	
THYSANOCRINUS	188	
Thysanocrinus aculeatus	190	
" canaliculatus	189	
" immaturus	191	
" liliiformis	191	
Tracks of Gasteropoda, 27, 29, 30, 31, 35, 36.		
TREMATOPORA	149	
Trematopora aspera	154	
" coalescens	150	
" granulifera	154	
" ostiolata	152	

Original Names.	Vol. II, page	Changed Names, Remarks, etc.
Trematopora punctata	151	
" sparsa	155	
" spinulosa	155	
" solida	153	
" striata	153	
" tuberculosa	149	
" tubulosa	151	
Trochoceras	335	
Trochoceras gebhardii	335	
" turbinata	336	

CORRECTED LIST OF THE FOSSILS DESCRIBED IN THE REPORT OF THE FOURTH GEOLOGICAL DISTRICT OF NEW-YORK

(EXCEPTING THOSE WHICH ARE CORRECTED IN THE PRECEDING LISTS).

ORGANIC REMAINS OF THE WATERLIME GROUP.

Original Names.	Page	Corrected Names, Remarks, etc.
Avicula rugosa	142	Undetermined.
Atrypa sulcata	142	Merista? sulcata.
Cytherina alta	142	Leperditia alta.
Delthyris plicatus	142	Spirifer plicatus.
Littorina antiqua	142	Holopea antiqua.
Tentaculites ornatus	142	

ORGANIC REMAINS OF THE PENTAMERUS LIMESTONE.

Atrypa lacunosa	*	Rhynchonella lacunosa.
Euomphalus profundus		Bucania profunda.
Lepocrinites gebhardi		Lepadocrinus gebhardi.
Pentamerus galeatus		

ORGANIC REMAINS OF THE DELTHYRIS SHALY LIMESTONE.

Strophomena punctulifera	Strophodonta punctulifera.
Strophomena radiata	

* The species given without references to page are from the Report of the Third District by Mr. Vanuxem, and were not repeated in the text of the Report of the Fourth District, but in the plates of fossils at the end of tho volume.

ORGANIC REMAINS OF THE ORISKANY SANDSTONE.

ORIGINAL NAMES.	Page	CORRECTED NAMES, REMARKS, etc.
Atrypa elongata	148	Rensselæria ovoides.
Atrypa peculiaris	148	Eatonia peculiaris.
Atrypa unguiformis	149	Orthis hipparionyx, *or* O. unguiformis.
Delthyris arenosa	148	Spirifer arenosa.

ORGANIC REMAINS OF THE ONONDAGA LIMESTONE.

Astrea rugosa	159	Acervularia rugosa.
Cyathophyllum	160	Cyathophyllum lesueuri.
Cyathophyllum dianthus	160	——— ———?
Delthyris undulatus		Spirifer undulatus.
Favosites alveolaris	157	This species has been referred to *Favosites (Emmonsia) hemispherica* of YANDELL & SHUMARD; but I am not satisfied of the identity, by comparison of specimens which I believe to be authentic.
Favosites fibrosa	159	——— ———?
Favosites gothlandica	157	Favosites basaltica.
Hipparionyx (Atrypa) consimilaris		Atrypa reticularis, *var.?*
Pentamerus elongata	132	Rensselæria elongata.
Syringopora ———?	160	

ORGANIC REMAINS OF THE CORNIFEROUS LIMESTONE.

Acroculia erecta	172	Platyceras erecta.
Atrypa prisca	175, 198	Atrypa reticularis.
Atrypa scitula	171	Merista scitula.
Calymene crassimarginata	172	Proetus crassimarginata.
Cyrtoceras undulatum	175	
Delthyris duodenaria	171	Spirifer duodenaria.
Euomphalus? rotundus	172	Pleurotomaria? rotunda.
Ichthyodorulite	174, 175	
Odontocephalus selenurus	175	Dalmania selenurus.
Orthis lenticularis	175	
Orthonychia ———	172	Platyceras (Orthonychia) subrectum.
Paracyclas elliptica	171	Lucina elliptica = ? L. proavia.
Pleurorhyncus trigonalis	171	
Pterinea cardiiformis	172	Megambonia cardiiformis.
Strophomena acutiradiata	171	Chonetes acutiradiata.
Strophomena crenistria	171	Strophodonta crenistria.
Strophomena lineata	175	Chonetes lineata.
Strophomena undulatum	175	Strophomena rugosa, *var.*
Tentaculites scalaris	172	

ORGANIC REMAINS OF THE MARCELLUS SHALE.

Original Names.	Page	Corrected Names, Remarks, etc.
Atrypa limitaris	180	Rhynchonella limitaris.
Avicula equilatera	180	Aviculopecten equilatera.
Avicula lævis	180	Pteronites? lævis.
Avicula muricata	180	———?
Orbicula minuta	180	Discina minuta.
Orthis nucleus	180	
Orthoceras subulatum	180	
Strophomena mucronata	180	Chonetes? mucronata.
Strophomena pustulosa	180	Productus pustulosus; *not* *P. pustulosus* of European authors.
Strophomena setigera	180	Chonetes setigera.
Tentaculites fissurella	180, 222	

ORGANIC REMAINS OF THE HAMILTON GROUP.

Atrypa concentrica	198	Spirigera = Athyris concentrica.
Atrypa concinna	200	Nucleospira concinna.
Atrypa rostrata	202	Merista rostrata.
Atrypa spinosa	200	Atrypa aspera.
Avicula decussata	203	Pteronites? decussata.
Avicula orbiculata	202	Aviculopecten orbiculata.
Bellerophon patulus	196	
Calymene bufo	200	Phacops bufo.
Cryphæus calliteles	200	Dalmania calliteles.
Cucullea opima	196	Nucula opima.
Cyathophyllum ——		Cyathophyllum vanuxemi.
Cyathophollum turbinatum		Heliophyllum halli.
Cypricardia truncata	196	———?
Cystiphyllum cylindricum	209	Cystiphyllum americanum.
Cystiphyllum (indet.)	209	
Dipleura dekayi	205	Homalonotus dekayi.
Delthyris fimbriata	208	Spirifer fimbriatus.
Delthyris granulifera	207	Spirifer granuliferus.
Delthyris macronota	207	Spirifer macronotus.
Delthyris medialis	208	Spirifer medialis.
Delthyris mucronata	198, 205	Spirifer mucronatus.
Delthyris sculptilis	202	Spirifer sculptilis.
Delthyris zigzag	200	Spirifer zigzag.
Loxonema nexilis	200	
Microdon bellastriata	196	
Modiola concentrica	196	Modiolopsis concentricus.

HAMILTON GROUP.

Original Names.	Page	Corrected Names, Remarks, etc.
Nucula bellatula	196	
Nucula lineata	196	
Nucula oblonga	196	Nuculites? oblonga.
Tellina ovata	196	——— ?
Orthonata undulata	205	
Strombodes ——— ?		Zaphrentis?
Strombodes distortus	210	Cyathophyllum? distortus.
Strombodes helianthoides	210	Heliophyllum halli.
Strombodes rectus	210	Streptelasma recta.
Strombodes simplex	210	Zaphrentis simplex.
Strophomena inequistriata	200	Strophodonta inequistriata.
Turbo lineatus	198	Pleurotomaria lineata.

ORGANIC REMAINS OF THE TULLY LIMESTONE.

Atrypa affinis	215	Atrypa reticularis.
Atrypa cubioides	215	Rhynchonella cuboides : Not *R. cuboides* of Europe = *R. subcuboides.*
Atrypa lentiformis	215	Atrypa reticularis.
Orthis resupinata	215	Orthis tulliensis.

ORGANIC REMAINS OF THE GENESEE SLATE.

Atrypa quadricostata	223	Rhynchonella quadricostata.
Avicula fragilis	222	
Lingula concentrica	223	
Lingula spatulata	223	
Orbicula lodensis	223	Discina lodensis.
Strophomena setigera	222	Chonetes setigera.

ORGANIC REMAINS OF THE PORTAGE GROUP.

Astarte [?] subtextilis	245	
Avicula speciosa	243	——— -?
Bellerophon expansus	243	Not *B. expansus* of Sowerby = *B. cyclopterus.*
Bellerophon striatus	245	
Cardium? [?] vetustum	245	
Clymenia? complanata	243	
Cyathocrinus ornatissimus	247	
Delthyris lævis	245	Spirifer lævis.
Fucoides graphica	241	
Fucoides verticalis	242	

PORTAGE GROUP.

Original Names.	Page	Corrected Names, Remarks, etc.
Goniatites bicostatus	245	
Goniatites sinuosus	243, 245	
Lucina retusa	245	
Nucula lineolata	245	
Orthis tenuistriata	245	
Orthoceras aciculum	243	
Pinnopsis acutirostris	243	Perhaps generically identical with *Ambonychia*.
Pinnopsis ornatus	243	
Ungulina suborbicularis	243	Generic relations undetermined.

ORGANIC REMAINS OF THE CHEMUNG GROUP.

Atrypa contracta	271	Rhynchonella contracta.
Atrypa dumosa	271	Perhaps identical with *Atrypa aspera*.
Atrypa duplicata	271	Rhynchonella duplicata.
Atrypa eximia	271	Rhynchonella eximia.
Atrypa hystrix	271	
Atrypa laticosta	271	Rhynchonella laticosta.
Atrypa laticosta, *var.*	271	Rhynchonella laticosta, *var.*
Atrypa mesacostalis	271	Rhynchonella mesacostalis.
Atrypa polita	271	Merista polita.
Atrypa? tenuilineata	271	
Atrypa tribulis	271	Atrypa reticularis.
Avicula acanthoptera	263	Pteronites acanthoptera.
Avicula damoniensis?	262	Pteronites? chemungensis.
Avicula longispina	262	Pteronites longispina.
Avicula pectiniformis	262	Aviculopecten pecteniformis.
Avicula signata	264	Aviculopecten signatus.
Avicula spinigera	262	Pteronites spinigera.
Calymene nupera	262	Phacops nupera. Perhaps a variety of *P. bufo*.
Delthyris acanthota	270	Spirifer acanthotus.
Delthyris acuminata	270	Spirifer acuminatus.
Delthyris cuspidata	270	Spirifer cuspidatus.
Delthyris disjuncta	269	Spirifer disjunctus [?].
Delthyris inermis	270	Spirifer inermis.
Delthyris mesacostalis	269	Spirifer mesacostalis.
Delthyris mesastrialis	269	Spirifer mesastrialis.
Delthyris mucronata	270	Spirifer mucronatus.
Filicites?	273, 275	Plumalina plumosa.
Lima glaber	264	Genus?

CHEMUNG GROUP.

Original Nabes.	Page	Corrected Names, Remarks, etc.
Lima obsoleta	264	Genus?
Lima rugæstriata	264	Aviculopecten rugæstriatus.
Orthis carinata	267	
Orthis impressa	267	
Orthis unguiculus	267	
Pecten? cancellatus	264	Aviculopecten cancellatus.
Pecten convexus	264	Aviculopecten convexus.
Pecten crenulatus	264	Genus?
Pecten dolabriformis	264	Aviculopecten dolabriformis.
Pecten duplicatus	264	Aviculopecten duplicatus.
Pecten striatus	264	Aviculopecten striatus.
Pterinea suborbicularis	264	Aviculopecten suborbicularis.
Sigillaria chemungensis,	273, 275	
Sphenopteris laxus	275	
Strophomena arctostriata	266	Strophodonta arctostriata.
Strophomena bifurcata	266	Strophodonta bifurcata.
Strophomena interstrialis	266	Strophodonta interstrialis.
Strophomena nervosa	266	Strophodonta nervosa.
Strophomena pectinacea	266	Strophodonta pectinacea.

ORGANIC REMAINS OF THE CATSKILL-MOUNTAIN GROUP.

Sauripteris taylori	281	Holoptychius taylori.
Scale of Holoptychus nobilissimus	281	Probably identical with the following :
Scale of Sauripteris	281	Holoptychius taylori.
Jawbone and teeth of ditto	282	Probably of *H. taylori*.

ORGANIC REMAINS OF THE SANDSTONE OF THE CONGLOMERATE.

Cypricardia? angustata	186	
Cypricardia contracta	291	Genus?
Cypricardia rhombea	291	Genus?
Euomphalus depressus	291	Not *E. depressus* of Sowerby = *E.*

CATALOGUE OF THE SPECIES OF FOSSILS DESCRIBED IN THE THIRD VOLUME OF THE PALÆONTOLOGY OF NEW-YORK;

INCLUDING THOSE FROM THE WATERLIME GROUP, THE LOWER HELDERBERG GROUP, AND THE ORISKANY SANDSTONE.

	Page
Acidaspis hamata	371
" tuberculatus	368
Acroculia	308
Anatina? sinuata	265
Anomalocystites	132
Anomalocystites cornutus	133
" disparilis	145
Aspidocrinus	122
Aspidocrinus callosus	123
" digitatus	123
" scutelliformis	122
Atrypa reticularis	253
Avicula æquiradiata	285
" bellula	289
" communis	286
" gebhardi	466
" manticula	284
" ? noviformis	279
" obliquata	285
" obscura	280
" pauciradiata	287
" recticosta	466
" schohariæ	283
" securiformis	290
" spinulifera	282
" subequilatera	281
" tenuilamellata	281
" textilis	288
" " *var.* arenaria	465
" umbonata	284
Beyrichia granulata	377
" notata	378
" " *var.* ventricosa	380
" oculina	377
" trisulcata	380
Brachiocrinus	118
Brachiocrinus nodosarius	118
Bronteus barrandi	350
Bucania profunda	341
Capulus	308
Chonetes complanata	418
Conularia huntiana	348
" pyramidalis	347
Coronocrinus	124
Coronocrinus polydactylus	124
Cypricardinia	266
Cypricardinia concentrica	268
" crassa	268
" dorsata	267
" lamellosa	266
" sublamellosa	267
Cyrtia dalmani	206
" rostrata	429
Cyrtoceras subrectum	342
Dalmania micrurus	359
" nasutus	362
" pleuroptyx	356
" tridens	361
Dictyocrinus	135
Dictyocrinus squamifer	135
Discina	159
Discina conradi	161
" discus	159
" grandis	406
" vanuxemi	162
Eatonia	432
Eatonia eminens	242
" medialis	241
" peculiaris	244, 436
" pumila	437
" singularis	243
" sinuata	438
" whitfieldi	437
Edriocrinus	119
Edriocrinus pocilliformis	121
" sacculus	143

	Page
Euomphalus disjunctus	340
" sinuatus	340
Eurypterus lacustris	391
" remipes	393
" macrocheirus	395
Holopea antiqua	294
" " *var.* pervetusta,	295
" danai	295
" elongata	295
" subconica	294
Homalonotus vanuxemi	352
Homocrinus	102
Homocrinus proboscidalis	138
" scoparius	102
Lepadocrinus	125
Lepadocrinus gebhardi	127
Leperditia alta	373
" hudsonica	375
" jonesi	372
" parasitica	376
" parvula	376
Leptæna concava	197
" ? nucleata	419
Leptocœlia	447
Leptocœlia concava	245
" dichotoma	452
" fimbriata	450
" fiabellites	449
" imbricata	246
Lichas bigsbyi	364
" pustulosus	366
Lingula centrilineata	155
" perlata	156
" rectilatera	156
" spathata	157
" spatiosa	158
Loxonema attenuata	296
" compacta	297
" fitchi	296
" ? obtusa	297
" planogyrata	298
Mariacrinus	104
Mariacrinus macropetalus	111
" nobilissimus	105
" pachydactylus	107
" paucidactylus	109
" plumosus	110
" ramosus	147
" stoloniferus	112
Megambonia	273
Megambonia aviculoides	274
" bellistriata	467
" cordiformis	278
" lamellosa	467
" lata	277
" mytiloidea	276
" oblonga	277
" obscura	277
" ovata	279
" ovoidea	276
" rhomboidea	275
" spinneri	274
" suborbicularis	273
Merista arcuata	249
" bella	248
" bisulcata	253
" (indet.)	252
" lævis	247
" lata	431
" meeki	252
" princeps	251
" subquadrata	249
Modiolopsis? dubius	264
Murchisonia bilirata	299
" extenuata	298
" minuta	298
Nucleospira	218
Nucleospira concentrica	223
" elegans	222
" ventricosa	220
Oncoceras ovoides	342
Orthis assimilis	175
" concinna	172
" deformis	174
" discus	165
" eminens	167
" hipparionyx	407
" insignis	173
" multistriata	176
" musculosa	409
" pedunculariis	174
" perelegans	171
" planoconvexa	168
" oblata	162
" " *var.* emarginata	164
" strophomenoides	177
" subcarinata	169
" tubulostriata	166

	Page
Orthis varica	179
Orthoceras clavatum	345
" ——— ?	345
" helderbergiæ	345
" longicameratum	343
" pauciseptum	346
" perstriatum	346
" rigidum	344
" rudis	346
" subtextile	344
" tenuiannulatum	345
Palæarca saffordi	271
" ventricosa	271
Pentamerus galeatus	257
" littoni	262
" pseudogaleatus	259
" verneuili	260
Phacops hudsonicus	355
" logani	353
Pileopsis	308
Platyceras	309
Platyceras agreste	338
" arcuatum	336
" billingsi	315
" bisinuatum	318
" bisulcatum	327
" calantica	328
" clavatum	337
" curvirostrum	338
" dilatatum	322
" elongatum	335
" " ? *var.*	335
" gebhardi	312, 474
" gibbosum	323
" incile	332
" intermedium	321
" lamellosum	330
" magnificum	476
" multisinuatum	319
" newberryi	333
" nodosum	473
" obesum	329
" patulum	477
" pentalobus	319
" perlatum	328
" perplicatum	325
" pileiforme	327
" platystomum	326
" " *var.* alveatum,	326
Platyceras plicatile	325
" plicatum	334
" pyramidatum	336
" reflexum	477
" retrorsum	320
" " *var.* abnormis,	321
" robustum	313
" sinuatum	314
" spirale	331
" subnodosum	474
" sulcoplicatum	324
" tenuiliratum	317
" tortuosum	472
" ?	473
" tubæforme	332
" trilobatum	316
" undulostriatum	336
" unguiforme	322
" unisulcatum	316
" ventricosum, 311,	475
" (Platyostoma) callosum,	478
Platycrinus parvus	114
" plumosus	113
" ramulosus	115
" tentaculatus	116
Platyostoma	299
Platyostoma arenosa	302
" depressa	301
" subangulata	301
" ventricosa	300, 469
Pleurotomaria labrosa	339
Proetus protuberans	351
Proctaster	134
Protaster forbesi	134
Pterygotus	398
Rensselæria	454
Rensselæria æquiradiata	255
" cumberlandiæ	464
" elliptica	256
" intermedia	463
" lævis	256
" marylandica	461
" mutabilis	254
" ovalis	458
" ovoides	456
" suessana	459
Rhynchonella abrupta	228
" acutiplicata	232
" æquivalvis	224

	Page
Rhynchonella altiplicata	231
" barrandi	442
" ? bialveata	233
" campbellana	239
" eminens	237
" fitchana	441
" formosa	236
" multistriata	440
" mutabilis	225
" inutilis	233
" nobilis	240
" nucleolata	227
" oblata	439
" planoconvexa	235
" pleiopleura	440
" principalis	443
" pyramidata	229
" ramsayi	446
" rudis	235
" semiplicata	224
" septata	443
" speciosa	444
" sulcoplicata	236
" transversa	234
" vellicata	230
" ventricosa	238
RHYNCHOSPIRA	213
Rhynchospira deweyi	216
" formosa	215
" globosa	215
" rectirostra	217
SPHÆROCYSTITES	130
Sphærocystites multifasciatus,	130
Spirifer arenosus	425
" arrectus	422
" concinnus	200
" cumberlandiæ	421
" cyclopterus	199
" intermedius	424
" macropleurus	202
" modestus	303
" octocostatus	205
" perlamellosus	201
" pyxidatus	428
" saffordi	203
" submucronatus	419
" tenuistriatus	204

	Page
Spirifer tribulis	420
" vanuxemi	198
Spirorbus laxus	349
Strophodonta beckii	191
" cavumbona	187
" headleyana	185
" leavenworthana	189
" lincklæni	415
" magnifica	414
" magniventra	411
" planulata	184
" punctulifera	188
" varistriata	180
" " *var.* arata	183
" vascularia	412
Strophomena conradi	194
" radiata	193
" rugosa	195
" " *var.* ventricosa,	417
" woolworthana	192
STROPHOSTYLUS	303
Strophostylus andrewsi	472
" depressus	306
" elegans	304
" expansus	470
" fitchi	306
" globosus	305
" matheri	471
" obtusus	305
" rotundatus	307
" transversus	470
TECHNOCRINUS	139
Technocrinus andrewsi	141
" sculptus	143
" spinulosus	140
" striatus	142
Tellinomya nucleiformis	263
Tentaculites elongatus	136
" irregularis	137
TREMATOSPIRA	207
Trematospira camura	212
" costata	210
" multistriata	209
" perforata	208
" simplex	211
" " *var.*	211

DONATIONS AND PURCHASES

DURING THE YEAR 1858.

I. FOSSILS FROM THE EOCENE TERTIARY OF PARIS,

PRESENTED BY W. C. JOHNSON, ESQ., OF UTICA.

CHAMA CALICULATA,
CYTHEREA NITIDULA,
CYTHEREA LEVIGATA,
ARCA BIANGULATA,
ARCA MODIOLIFERA,
LUCINA GIGANTEA,
CARDELLA, sp.?
CORBA PECTUNCULUS,
PECTUNCULUS, sp.?
PECTUNCULUS GENICULATUS,
CARDIUM PENDULOSUM,
CARDITA IMBRICATARIA,
ANOMIA EPIPHRAM,
ASTRÆA FLABELLULA,
NUCULA MARGARITACEA,
CORBULA ANSTERIA,
CORBULA RUGOSA,
CORBULA STRIATA,
DENTALIA DENTALIS,
PELIOPSIS CORNUCOPIA,
CALYPTERA TROCHIFORMIS,
NATICA MUTABILIS,
NATICA CARAPACEA,
NATICA EPISTOLARIA,
AMPULLARIA VILMETA,
CIGARETUS CANALICULATUS,
ANCILLARIA BUCCINOIDES,
ANCILLARIA OLIVULA,
ANCILLARIA, sp.?
PLEUROTOMA CLAVICULATUS,
PLEUROTOMA FILOSA,
PLEUROTOMA DENTATA,
PLEUROTOMA BREVICAUDATA,
MITRA FISSULINA,
MITRA TEREBELLUM,
TEREBRA PLICATELLA,
TEREBELLUM, sp.?
ROSTELLARIA FISSINELLA,
ROSTELLARIA MACROPTERA,
ROSTELLARIA COLUMBELLA,
TURRITELLA IMBRICATARIA,
TURRITELLA INTERMEDIA,
MELANIA CASTELLATA,
MELANIA MARGINATA,
MUREX CRISPUS,
FUSUS IMPLICATA,
FUSUS ACICULATUS,
FUSUS NEOMII,
FUSUS BULLIFORMIS,
FUSUS FACULENS,
TROCHUS AGLUMANUS,
TROCHUS TRICARINATUS,
CONUS DEPREDATUS,
BUCCINUM STROMBOIDEUS,
VOLUTA SPINOSA,
VOLUTA MARICINA,
VOLUTA MUCRONATA,
VOLUTA HARPA,
VOLUTA MUSCULINA,
CERITHIUM GIGANTEUS,
CERITHIUM TEREBELLA,
CERITHIUM ECHINOIDEUS,
CERITHIUM HEXAGONUM,
CERITHIUM SECATUM,
CERITHIUM LABELLATUM,
CERITHIUM PLEUROTOMOIDES,
CERITHIUM, sp.?
SEPIA CUVIERI,
ECHINOLAMPUS SIMILIS,
SOLANIUM CANALICULATUS,
CYPRÆA ELEGANS,
DELPHINULA STRIATA.

JOHN CHAMBERS, ESQ., OVID, SENECA COUNTY.

Two large boxes of fine and rare fossils from the Tully limestone, containing several new species.

PROFESSOR A. J. UPSON.

Fossils from the Old Redsandstone, Delaware county.

II. FOSSILS FROM PHILIP P. CARPENTER, WARRINGTON, ENG.

1. POST-PLIOCENE FOSSILS.

CORALLINE CRAG.

Coral, sp.?	Sudbourn.
Bryozoa,	"
Retepora,	Aldborough.
Cellapora,	"
Retepora, &c.	Sudbourn.
Lepralia, Cellapora on Pecten,	"
Lepralia,	"
Cast of Lima and Membranipora,	Aldborough.
Lepralia on Pecten (4),	Sudbourn.
Lepralia and Membranipora,	"
Pecten,	"
Cellapora on Pecten (2),	"
Membranipora,	"
Lepralia,	"
Pecten maximus,	Sutton.
Pecten lens,	Sudbourn.
Lucina borealis,	"
Astarte (2),	"
Voluta lamberti (cast of),	"
Terebratula,	"
Venericardia,	"
Ostrea,	"
Lima,	"
Turritella imbricata,	"

RED CRAG.

Tellina solidula,	Sutton.
Cardium edula,	"
Tellina proxima,	"
Astarte,	"
Tellina,	"
Mactra,	"
Tellina crassa,	"
Pecten glycimeris,	"
Venericardia senilis,	"
Pecten opercularis,	"
Fusus gracilis,	"
Nassa retrorsa,	Brightwell.
Litorina litorea,	Sutton.
Purpura lapillus,	"
Fusus antiquus,	"
Turritella communis,	"
Pinguicula buccinea,	"
Cypræa europea,	Alderton.
Echinocyanus pusillus,	Sutton.
Cancer leachii (detrital beds),	"
Fish-teeth "	"
Otolith (ear-bone) of a whale,	"

MAMMALIFEROUS CRAG.

Astarte antiqua,	Chilsford.
Tellina proxima,	"
Purpura lapillus,	"
Pecten operculatus,	"
Mangelia turricula,	"

2. EOCENE TERTIARY.

Corbula, Lucina (2), Natica (2), Trochus : Grignon, France.

3. GREENSAND.

Terebratula biplicata,	Cambridge.
Terebratula pectila,	Westminster.
Myoconcha crassa,	Dundry.
Trochiarthrus,	Cambridge.
Trochiarthrus warburtoni,	"
Nucleolites carinatus,	Warminster.
Galerites subaculeatus,	"
Echinus granulosus,	"
Vertebra of osseous fish,	Cambridge.
Vertebra of Lamna,	"
Teeth of Lamna,	"

4. INFERIOR OOLITE.

Terebratula, sp.? (2),	Dundry.
Terebratula elegans,	Cambridge.
Terebratula, sp.?	Blackdown.
Ammonite, sp.?	Dundry.
Ostrea, sp.?	"

5. CARBONIFEROUS LIMESTONE, ENGLAND.

Terebratula pleurodon,	Skipton.
Terebratula hastata,	Kildare, Ireland.
Terebratula acuminata,	Skipton.
Orthis connivens,	"
Leptæna analoga,	"
Productus martini,	"
Productus fimbricata,	"
Productus costatus,	Richmond.
Spirifera rhomboidea,	Skipton.
Spirifera peregrina,	Kildare, Ireland.
Spirifera glaber,	Bolland.
Nerita spirata,	"
Cirrus rotundatus,	Skipton.
Actinocrinus triacanthadactylus,	Kildare.
Actinocrinus gilbertsoni,	Skipton.
Platycrinus lævis,	"
Cadenaster acutus,	"
Asaphus punctatus,	"

III. LIST OF FOSSILS DEPOSITED IN THE STATE CABINET,

BY LEDYARD LINCKLAEN, ESQ.;

AND SUBJECT TO HIS ORDER.

Five parts of ASTROLEPIS,		Marcellus shale.
Four HOMALONOTUS DEKAYII,		Hamilton group.
One GONIATITES,		"
Two GOMPHOCERAS,		"
Three CYRTOCERAS,		"
Two ORTHOCERAS,		"
Two ORTHOCERAS,		Marcellus shale.
One FENESTELLA,		Hamilton group.
One large Plant,		"
One slab ORTHIS STRIATUS,		Waterlime group.
One PHACOPS DECORUS,		Lower Silurian, Europe.
One ILLÆNUS CRASSICAUDATUS.		
TUBA SPINOSA,	Upper Silurian :	Littem, Bohemia.
PLEURORHYNCHUS ORNATUS,	"	"
TEREBRATULA PSEUDOLIVONICA,	"	"
SPIRIFERA TRAPEZOIDALIS,	"	"
TEREBRATULA PRINCEPS,	"	"
CAPULUS CONOIDEUS,	"	"
TEREBRATULA MECHANICA,	"	"
SPIRIFERA NAGEDUM,	"	"
NATICA GREGARIA,	"	"
TEBEBRATULA TUMIDA,	"	"
PENTAMERUS ACUTILOBATUS,	"	"
SPIRIFERA SECANS,	"	"
SPIRIFERA ROBUSTA,	"	"
CARDIOLA CORNUCOPIA,	"	Barich, Bohemia.
TEREBRATULA PISCIFER,	"	Komeprus, Bohemia.
PENTAMERUS SIBERICA,	"	"
POLYDILASMA LAMARCKII,	Cretaceous :	Germany.
AMMONITES VIRGATUS,	Jurassic :	"
AMMONITES WALCOTII,	Lias :	"
AMMONITES CORDATUS,	Oolite :	"
AMMONITES AMALTHUS,	Lias :	"
AMMONITES HUMPHRIESANUS,	Lias :	"
AMMONITES, sp.?	Oolite :	"
AMMONITES HOLLANDIA,	Lias :	"
Two LYONSIA ALDOUSIA,	Eocene :	"
Four BRACHIOPODA, sp.?	Eocene :	"
One BUCCINUM ARCUATUM,	Devonian :	"
One CHÆTETES RADIENS,	Devonian :	"
One AMMONITES VARIABILIS,	Lias :	"
One TRIGONIA MAJOR,	Oolite :	"
One AMMONITES BICARINATUS,	Lias :	"
One MEGALODON CUCULLATUS,	Devonian :	"

IV. LIST OF BRITISH MOLLUSCA,

PURCHASED OF MR. PHILIP P. CARPENTER, WARRINGTON, ENGLAND.

Echinoderms, sp.?	3	Artemis exoleta	3
Amphidotus cordatus	2	Tapes virginea	4
Asterias, sp.?	1	Tapes aurea	1
Echinocyamus pusillus	8	Tapes decussata	4
Balanus porcatus	2	Tapes pustulata	1
Balanus tintinnabulum	1	Lucina borealis	4
Lepas ansifera	3	Lucina leucoma	6
Pennatula phosphorea	1	Lucina undata	3
Cineras vittata	2	Lucina flexuosa	3
?	2	Lucina spinifer	1
?	1	Terebratula caput-serpens,	5
Terebella, sp.?	1	Crania anomala	2
Spirorbis granulatus	mass.	Isocardia cor	1
Spirorbis corrugatus	mass.	Cardium edule	3
Spirorbis, sp.?	mass.	Cardium pygmæum	9
Cæcum trachæ	5	Cardium norvegicum	1
Cæcum, sp.?	3	Cardium aculeatum	2
Serpula complexa	mass.	Cardium echinatum	2
Spirorbis, sp.?	60	Mactra solida	4
Cæcum, sp.?	1	Mactra stultorum	6
Dentalium tarentum	9	Mactra tunicata	3
Dentalium dentalis	3	Mactra subtruncata	2
Dentalium ditrupa	2	Mactra elliptica	1
Patella athletica	6	Diplodonta rotundata	1
Patella angulata	12	Pandora obtusa	1
Patella pellucida	14	Galeomma turtoni	1
Acmæa testudinalis	6	Psammobia tellinella	2
Acmæa, sp.?	6	Psammobia ferroensis	3
Pelispris hungariensis	1	Psammobia vespertina	1
Acmæa virginalis	9	Tellina donacina	3
Emarginata rosea	7	Tellina solida	30
Emarginata reticulata	21	Tellina incarnata	3
Punctinella noachia	1	Tellina tenuis	22
Calyptera sinensis	19	Tellina fabula	10
Anomia patelliformis	20	Tellina crassa	1
Chiton asellus	5	Syndomya prismatica	2
Chiton cinereus	1	Syndomya alba	6
Chiton ruber	1	Donax antinus	14
Pecten maximus	3	Mya truncata	2
Pecten operculatus	6	Mya arenaria	1
Pecten varius	5	Scrobicularis piperita	1
Pecten fusus	5	Cochlodesma prætenue	1
Pecten tigrinus	1	Throna phasealina	3
Pecten niveus	1	Pectunculus glycineris	4
Venus striatula	18	Arca lactea	30
Venus ovata	18	Saxicava arctica	15
Venus carina	1	Saxicava rugosa	5
Cypræa islandica	2	Corbula nucleus	12
Cypræa, sp.?	2	Cardium fasciatum	4

Cardium nodosum	5
Syndomya tenuis	1
Astarte triangularis	3
Monticula bidentata	7
Monticula ferruginosa ..	1
Kellia suborbicularis ...	2
Kellia rubra	10
Leda cordata	2
Lepton squamosa	3
Planorbis vortex.....	3
Venerupis vius	3
Modiola modiolus	5
Modiola tulipa	1
Modiola barbata	1
Dreissena polymorpha ...	3
Pholas candida	1
Pholas dactylus	1
Pholas crispata	1
Nucula nucleus	16
Nucula nitida	2
Lima hians	3
Lima suborbicularis	1
Lima lascombii	1
Mytilus edulis.....	12
Mytilus dissimulis	3
Solen marginatus	2
Solen curis, *var.* magna ...	1
Solen siliqua	3
Solen ensis	1
Solen pellucidus	1
Erratisolen legumen	3
Crenella discors	2
Crenella marmorata	3
Thrasia distorta	2
Sphenia binghami	9
Anomia ephippium.....	7
Pisidium pulchellum	2
Pisidium amnicum.....	1
Pisidium pusillum	2
Pisidium henslowianum ..	3
Cyclus cornea	1
Buccinum undatum	16
" " (spawn) .	1
Buccinum, sp.?	2
Fusus contiguus.....	3
Fusus propinquus	1
Fusus islandicus	19
Fusus, sp.?.....	4
Nassa reticulata	7
Nassa incrassitella	33
Nassa pygmæa	29
Aporrhais pes-pelican ...	5
Velutina lævigata	24
Purpura lapillus	14
Litorina litorea	7
Litorina patula	7
Litorina neatoides	7
Litorina sextilis	11
Litorina fabalis	2
Litorina litoralis	28
Litorina rudis	67
Litorina plicata	5
Litorina, sp.?.....	32
Murex corallinus	5
Natica monalifera	8
Natica montagui	8
Natica, sp.?	1
Natica, sp.?	32
Sialaria communis	1
Sialaria clathratula	2
Sialaria turtoni	1
Turritella communis	32
Trochus umbellicatus	15
Trochus majus	14
Trochus exiguus	25
Trochus millegranus	1
Trochus cinereus	11
Trochus tumidus	7
Trochus montagui.....	4
Trochus lineatus	3
Trochus umbilicata	4
Trochus, sp.?	5
Trochus, sp.?	23
Cypræa europæa	24
Erato lævis	1
Tornatella fasciculata ..	6
Bulla physalis	2
Marginella lineatus.....	10
Marginella costata.....	2
Marginella nebula	1
Marginella rufa	4
Marginella tunicula	2
Scaphander ligneus	9
Haliotis tuberculata	1
Lucina venita	5
Lucina puteolus	14
Lucina crassior	5
Lachesis minima	5
Turtonia minuta	1
Terebro navalis	2
Trophon barriensis	1
Eluma distorta	1
Eluma bilineata	1
Eluma polita	3
Phillione aperta	1
Cerithium reticulatum ...	18
Cerithium adversa.....	9
Cerithiopsis tubercularis,	2
Rissoa parva	11
Rissoa crenulata	9
Rissoa striatula.....	3
Rissoa labrosa	9

Rissoa beanii 2
Rissoa rubra 3
Rissoa costula 5
Rissoa calathus..... 3
Rissoa striatus 9
Rissoa costata 5
Rissoa punctatus 5
Rissoa ventrosa 2
Rissoa inconspicua 9
Rissoa semistriata 3
Rissoa ulvæ 10
Rissoa cingullus 3
Rissoa ulvæ (variety) 5
Rissoa infinitesima 2
Rissoa tellinica 2
Odostomia eulimides 3
Odostomia acuta 1
Odostomia plicata 1
Odostomia interstincta .. 3
Odostomia excavata 1
Odostomia unidenta 3
Odostomia spiralis 5
Odostomia resonoides 1
Chemnitzia elegantula .. 5
Chemnitzia rufa 1
Chemnitzia scalaris..... 3
Clychna cylindrica 1
Clychna obtusa 9
Phasianella pullus 9
Odeospis subcarinatus ... 3
Truncatella montagui ... 9
Unio tumidus 1
Anodonta anatina 2
Anodonta ventricosa 1
Anodonta cygnea 1
Cyclas cornea 60
Cyclas riveculata 15
Cyclas lacustris 2
Cyclas calículata 13
Pisidium amnicum 19
Pisidium cinereum..... 4
Pisidium pulchellum 3
Pisidium pusillum 3
Ancylus oblongus 6
Ancylus fluviatilis 13
Paludina listeri 6
Paludina vivipora 11
Bithynia ventricosa 2
Limneus stagnatus 9
Limneus truncatus 10
Limneus palustris 19
Limneus peregra 23
Bithynia ventriculum.... 15
Neritina fluvialis 32
Physa fontinalis..... 12
Physa hypernoricum 12
Valvata piscinalis 9
Planorbis corneus 9
Planorbis marginatus.... 17
Planorbis carinatus 5
Planorbis vortex..... 19
Planorbis contortus 7
Planorbis nautilus 5
Planorbis nitidens 7
Planorbis albus 8
Planorbis spirorbis..... 3
Assinea, sp.?..... 1
Melania contorta 1
Limnea peregra (fossil) .. 3
Bithynia articulata, do .. 1
Valvata piscinalis, do .. 5
Ancylus fluviatilis, do .. 1
Helix pomatia 3
Helix aspera..... 17
Helix nemoralis, & varieties, 142
Helix arbustorum 17
Helix pisana 27
Helix virgata 50
Helix sericea..... 2
Helix pygmæa 5
Helix umbilicata 7
Helix aculeata..... 1
Helix ericetorum..... 14
Helix lapicida 11
Helix rufiens 15
Helix cantiana..... 5
Helix carthusiana..... 1
Helix caperata..... 18
Helix rotundata 22
Helix hispidula 32
Helix fulva 3
Helix pulchella 7
Zonites cellaria 21
Zonites purus 3
Zonites alaria 4
Zonites crystallinus..... 30
Zonites nitidus 5
Zonites nitidulus 8
Bulimus acutus..... 9
Bulimus obscurus 5
Clausilia laminata 9
Clausilia nigricans..... 45
Conovulus denticulata .. 35
Conovulus bidentatus 6
Cyclostoma elegans 8
Zua lubricata 16
Balea fragilis..... 9
Micatula .....
Succinea putris 16
Succinea oblongus 3
Achatina acicula 5
Pupa secale 7

Pupa muscorum	9	Pupa umbilicata	7
Pupa anglica	3	Charichium minimum	5
Pupa pygmæa	5	Acme lineata	

V. LIST OF SHELLS FROM MR. CUMING, ENGLAND.

	Names.	Localities.	Authors.
1.	3 Lingula anatina	Philippines.	*Lamarck.*
2.	2 Terebratula australis ..	Australia.	do
3.	2 T— pulchella.....	Sandwich islands.	*Sowerby.*
4.	2 T— rubicunda	New-Zealand.	do
5.	2 T— *var*.....	Do.	do
6.	2 T— truncata	Mediterranean, Sicily.	*Lamarck.*
7.	2 T— caput-serpentis .	British.	*Linneus.*
8.	2 Orbicula lamellosa	Peru.	*Broderip.*
9.	2 Crania personata	British.	*Kœninghaus.*
10.	2 Isocardia communis	China.	*Reeve.*
11.	1 Donax scortum.....	Cape of Good Hope.	*Linné.*
12.	1 Achatina zebra	East Coast of Africa.	*Lamarck.*
13.	1 A— kraussi	Do.	*Reeve.*
14.	1 A— lamarckii	Do.	*Pfeiffer.*
15.	1 A— marginata.....	West Coast of Africa.	*Swainson.*
16.	1 A— fulica	Mauritius.	*Ferussac.*
17.	1 Bulimus mauritianum ...	Venezuela.	*Pfeiffer.*
18.	1 B— do. *var.*	Do.	do
19.	1 B— regina	Meobamba.	*Ferussac.*
20.	2 B— metaformis	Philippines.	*Sowerby.*
21.	2 B— kochii	Do.	*Pfeiffer.*
22.	2 B— hydrophana.....	Do.	*Sowerby.*
23.	2 B— mirabilis	Do.	*Ferussac.*
24.	1 B— fulgens	Do.	*Sowerby.*
25.	1 B— pfeifferi	Lo.	*Reeve.*
26.	1 B— philippensis.....	Do.	*Pfeiffer.*
27.	1 B— fulgetrum.....	Do.	*Broderip.*
28.	1 B— rugogaster	Do.	*Ferussac.*
29.	1 B— pythogaster	Do.	do
30.	1 B— reevei	Do.	*Broderip.*
31.	1 B— daphnis	Do.	do
32.	1 B— faunus	Do.	do
33.	2 B— mindoroensis....	Do.	do
34.	1 B— electricus.....	Do.	*Reeve.*
35.	1 B— chrysalidiformis,	Do.	*Sowerby.*
36.	2 B— concinnus	Do.	do
37.	2 B— partuloides.....	Do.	*Broderip.*
38.	1 B— lignarius	Do.	*Pfeiffer.*
39.	1 B— dryas	Do.	*Broderip.*
40.	1 B— sylyanus	Do.	do

	NAMES.	LOCALITIES.	AUTHORS.
41. 2	BULIMUS LUZONICA	Philippines.	*Sowerby.*
42. 2	B— *var.*	Do.	do
43. 1	B— SIMPLEX.....	Do.	*Jones.*
44. 1	B— PERVERSUS	Malacca.	*Müller.*
45. 1	B— CHLORIS	Philippines.	*Reeve.*
46. 1	HELIX OVUM	Do.	*Valenciennes.*
47. 1	H— RHŒA	Do.	*Pfeiffer.*
48. 1	H— LAMARCKIANA	Do.	*Reeve.*
49. 1	H— PAN	Do.	*Broderip.*
50. 1	H— ROISSYANA	Do.	*Ferussac.*
51. 2	H— PULCHERRIMA	Do.	*Sowerby.*
52. 2	H— SEMIGRANOSA	Do.	do
53. 2	H— LUZONICA	Do.	do
54. 2	H— ZONIFERA	Do.	do
55. 2	H— SPHÆRICA	Do.	do
56. 2	H— COCCOMELUS	Do.	do
57. 2	H— INTORTUS	Do.	do
58. 2	H— do. *var.*	Do.	do
59. 2	H— ILLOCOENSIS	Do.	do
60. 2	H— do. *var.*	Do.	do
61. 2	H— ANNULATA	Do.	do
62. 2	H— do. *var.*	Do.	do
63. 2	H— BALTEATA, *var.* ..	Do.	do
64. 2	H— MORICAUDI	Do.	do
65. 2	H— LISTERI	Do.	*Gray.*
66. 2	H— ROTA	Do.	*Broderip.*
67. 2	H— BEGONIA	Do.	*Ferussac.*
68. 2	H— MARGINATA.....	Do.	*Müller.*
69. 2	H— SIRENA	Do.	*Beck.*
70. 1	H— PORPHYRIA	Do.	*Pfeiffer.*
71. 1	H— CADUCIOR	Do.	*Reeve.*
72. 2	H— ZEBUENSIS	Do.	*Broderip.*
73. 1	H— VIRGO	Do.	do
74. 2	H— AMŒNA	Do.	*Pfeiffer.*
75. 2	H— MONTICULA	Do.	*Sowerby.*
76. 1	H— XANTHOTRICA	Do.	*Pfeiffer.*
77. 2	H— FIBULA	Do.	*Broderip.*
78. 2	H— VITTATA	Ceylon.	*Müller.*
79. 1	H— WALTONI.....	Do.	*Reeve.*
80. 1	H— PHŒNIX	Do.	*Pfeiffer.*
81. 1	H— BISTRIALIS.....	Do.	*Beck.*
82. 2	H— ERRONEA.....	Do.	*Albers.*
83. 1	CYCLOPHORUS OCULIS-CAPRI,	Java.	*Gray.*
84. 2	C— BORNEENSE	Borneo.	*Metcalf.*
85. 2	C— CEYLANICA.....	Ceylon.	*Sowerby.*
86. 1	C— SEMISULCATA.....	Malacca.	do
87. 2	OPISTHOPORUS BIROSTRE...	Borneo.	*Pfeiffer.*
88. 2	O— TAYLORIANUS	Do.	do
89. 2	PTEROCYCLOS TENUIPLICATUM,	Do.	*Metcalfe.*
90. 1	CYCLOTUS DYSONI	Mexico.	*Pfeiffer.*
91. 2	C— INCA.....	Venezuela.	*D'Orbigny.*
92. 2	CYCLOSTOMUS CREPLINI....	Madagascar.	*Ferussac.*
93. 1	TIARA THIARELLA.....	Seyschelles.	*Linneus.*
94. 1	ZIZIPHINUS ANNULATUS ...	Upper California.	*Martyn.*

	Names.	Localities.	Authors.
95. 1	Guildfordia imperialis ..	China.	*Philippi.*
96. 1	Murex palma-rosæ	Ceylon.	*Lamarck.*
97. 1	M— martynianus	Philippines.	*Reeve.*
98. 1	M— sinensis	China.	*Sowerby.*
99. 1	M— microphylla	Madagascar.	*Lamarck.*
100. 1	M— cumingii	Philippines.	*H. Adams.*
101. 1	Neptunea islandica	Britain.	*Lamarck.*
102. 1	Triton australis	Australia.	do
103. 1	Pleiodon ovatum	East Coast of Africa.	*Swainson.*
104. 1	Fissurella picta.....	Straits of Magellan.	*Lamarck.*
105.	A group of Cataphragmus polymerus,	Australia.	*Darwin.*
106. 1	Ætheria semilunata....	River Nile.	*Lamarck.*
107. 1	Cleidotherus chamoides .	Sidney.	*Stutchbury.*
108. 2	Cæcella cumingii	Philippines.	*Lamarck.*
109. 1	Conus nocturnus	Do.	*Bruguière.*
110. 2	C— lignarius	Do.	*Reeve.*
111. 1	C— textile.....	Do.	*Linneus.*
112. 1	C— verriculum	Do.	*Reeve.*
113. 1	C— nemocamus	Do.	*Bruguière.*
114. 1	C— amadis	Ceylon.	*Martyn.*
115. 1	C— magus	Philippines.	*Lamarck.*
116. 1	C— stercus-muscarum,	Do.	do
117. 1	C— miles	Do.	*Linneus.*
118. 1	C— ermineus	Do.	*Chemnitz.*
119. 1	C— canonicus	Do.	*Bruguière.*
120. 1	C— striatus.....	Do.	*Linné.*
121. 1	C— gubernator	Madagascar.	*Bruguière.*
122. 1	C— achatinus.....	Malacca.	*Chemnitz.*
123. 1	C— monile	Ceylon.	*Bruguière.*
124. 1	C— omaria	Philippines.	do
125. 1	Ampullaria ampullacera,	Do.	*Linné.*
126. 1	Cytherea chione	British.	do
127. 1	Cassis nov. spec.	Madeira.	
128. 1	Oliva erythrostoma	Philippines.	*Lamarck.*
129. 1	O— tremolina	Do.	do
130. 1	Cardium aculeatum	British.	*Linné.*
131. 1	Mitra episcopalis.....	Philippines.	*Argenville,*
132. 2	Amphipeplia cumingii....	Do.	*Pfeiffer.*
133. 1	Pecten senatorius	Do.	*Gmelin.*
134. 1	P— radula.....	Do.	*Lamarck.*
135. 1	P— cumingii	Australia.	*Reeve.*
136. 1	Marginella cœrulescens,	Panama.	*Lamarck.*
137. 1	M— quinqueplicata..	Malaeca.	do
138. 1	M— glabella.....	West Africa.	do
139. 1	M— cornea	Do.	do
140. 1	M— lineata	Do.	do

With H. Cuming's compliments.

80 Gower-street, Bedford Square, London.

July 3, 1858.

VI. DONATIONS FOR ECONOMIC GEOLOGY.

MESSRS. B. & J. CARPENTER, of Lockport, Niagara county,
Contributed two specimens of the NIAGARA LIMESTONE.

MR. HENRY LEWIS, of Utica, Oneida county :
TRENTON and BIRDSEYE LIMESTONE, a block of each.

MR. A. A. BOYCE, of Utica, Oneida county :
ONEIDA CONGLOMERATE.

MR. BENJAMIN, of Utica, Oneida county :
A slab of PORTAGE ROCK used for flagging, from Covert, Seneca county; and a block of CORNIFEROUS LIMESTONE, from Cassville.

MR. WILLIAM JONES, of Utica, Oneida county :
Two specimens of CLINTON ROCK, from his quarry in New-Hartford.

MR. FREDERICK TUTTLE, of Clinton, Oneida county :
Specimen of IRON ORE from the Clinton ore bed.

HON. EDWIN DODGE, of Gouverneur, St. Lawrence county :
IRON ORE, from his ore bed.

R. B. HOWLAND, ESQUIRE, of Cayuga county :
GYPSUM from his quarries; also SELENITE with crystals of SULPHUR.

T. A. HOPKINS, ESQUIRE, of Williamsville, Erie county :
HYDRAULIC LIMESTONE, from the Onondaga-salt group.

MR. WENDEL FOGLESONGER, of Williamsville, Erie county :
ONONDAGA LIMESTONE.

VII. MISCELLANEOUS.

From HORACE AVERILL, Esquire :

Specimens of Iron, Zinc, Copper, Lead and Silver ores, from Mine hill, Roxbury, Litchfield county, Connecticut.

From the Trustees of Cortland Academy, Homer, Cortland county :

A large Elephant's tooth.

From Messrs. THOMAS COLE & JOHN A. SHARTS :

A live Banded Proteus.

From BENJAMIN MARSH, Esquire, of Albany :

Section of a Petrified Tree, from Arizonia.

From Colonel M'CHESNEY, of Troy, Rensselaer county :

Fossil teeth of the American Horse, found in Troy.

From W. V. MANLY, of Albany :

The jaws of a Shark, and two *Limuli.*

From Mr. JAMES I. BARCLAY :

A slab of Trenton limestone, with *Leptæna alternata*, from Elk county, Pennsylvania.

ASA W. DOUGLASS, Esquire, of Lockport, Niagara county,

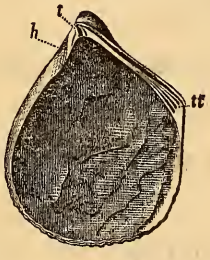
Deposited in the State Cabinet, subject to his order, an *Orthoceras annulatum* and a *Lichas boltoni.*

The Regents are indebted to Professor Haskins, of Buffalo, for his valuable services in assisting the Curator to collect fossils.

SUPPLEMENTARY NOTE ON THE GENUS AMBONYCHIA.

Since the preceding pages were printed, I have been able, through the kindness of Professor Safford of Tennessee, to illustrate more fully the hinge-structure of *Ambonychia radiata*. The accompanying figure 1 shows the hinge-line, the cardinal teeth *t*, and the lateral teeth *tt*. On the anterior side, the margin of the shell is sinuate for the passage of the byssus *b*. The latter character is likewise more distinctly shown in figure 2, which is an anterior view of the right valve.

1



2

James Hall.

ERRATA.

Page 10, note at bottom of page, for 1847, read 1857.
Page 14, note 4th line from bottom, for 1847, read 1857.

CONTENTS.

PAGE

REGENTS OF THE UNIVERSITY, AND STANDING COMMITTEES 2

ANNUAL REPORT OF THE REGENTS 3

ACCOUNT CURRENT 5

CONTRIBUTIONS TO THE PALÆONTOLOGY OF NEW-YORK, BY JAMES HALL 7

Notice of the Ganera *Ambonychia*, *Palæarca* and *Megambonia* 8

Observations on the Genera *Capulus*, *Pileopsis*, *Acroculia* & *Platyceras*, 15

Observations on the Genera *Platyostoma* and *Strophostylus* 20

Observations on the Genus *Nucleospira*, etc 23

Observations on the Genus *Eatonia* 34

Observations on the Genus *Rensselæria* 38

Observations on the Genus *Camarium* 42

Notes upon the Genus *Graptolithus* 45

Trilobites of the Shales of the Hudson-river group 59

Corrected Catalogue of the Fossils described in the Palæontology of New-York 63

Fossils of the first volume 65

Fossils of the second volume 77

Fossils of the third volume 93

Corrected List of Fossils described in the Report of the Fourth Geological District of New-York 87

DONATIONS AND PURCHASES DURING THE YEAR 1858 97

1. Fossils from the Eocene Tertiary of Paris, presented by W. C. JOHNSON, 98
2. Fossils from England, presented by P. P. CARPENTER 99
3. Fossils deposited in the State Cabinet by L. LINCKLAEN 101
4. List of British Mollusca, purchased of P. P. CARPENTER 102
5. List of Foreign Shells, presented by H. CUMING 105
6. Donations for Economic Geology 108
7. Miscellaneous donations and items ..... 109 & 98

SUPPLEMENTARY NOTE ON THE GENUS AMBONYCHIA, BY JAMES HALL 110